ADDENDUM NO. 6
TO
PLANS AND SPECIFICATIONS
FOR
PĀHOA PARK MASTER PLAN
PHASE I
JOB NO. PR-4234
AT
PĀHOA, PUNA, HAWAIʻI
COUNTY AND STATE OF HAWAIʻI

NOTICE TO BIDDERS

The items listed below are made a part of the current contract and shall govern the work, taking precedence over the previously issued specifications and drawings governing the particular item of work mentioned.

PRE-QUALIFIED AND APPROVED SUBSTITUTIONS

The following items hereinafter listed are approved as equal to the previously specified items, provided all requirements of the contract documents are met.

Approval shall not in any circumstances be construed as an approval for deviations from the contract documents unless the entity seeking such approval has in writing, specifically called the engineer or approving agency's attention to each such deviation at the time of submission. Said entity and / or contractor shall be responsible for the coordination of the work pertinent to the affected materials, equipment and labor to insure proper execution of work as per the intent of the documents.

Section and Paragraph	Specified Item or Product	Accepted Substitution	Remarks
11680	**GameTime®** Various Components	**BCI Burke Company, LLC** Various Components	See attached revised specification section 11680, 17 pages

REQUEST FOR INFORMATION/REQUEST FOR CLARIFICATION

1. **QUESTION:** *Can a C-68MI Specialty License holder install roof systems on all buildings (Play Court, Comfort Station, Concession Booth, Auxiliary Buildings)?*

   RESPONSE: No, a C-68MI Specialty License Holder can only install the roof system on a pre-engineered metal building (Play Court).

SPECIFICATIONS

ITEM NO. 1 – Section 02200 – EARTHWORK

DELETE in its entirety and **REPLACE** with attached, six (6) pages.

ITEM NO. 2 – Section 02361 – TERMITE CONTROL

DELETE in its entirety and **REPLACE** with attached, four (4) pages.

ITEM NO. 3 – Section 02740 – SEPTIC SYSTEMS

DELETE in its entirety and **REPLACE** with attached, three (3) pages

ITEM NO. 4 – Section 02821 – CHAIN LINK FENCES AND GATES

DELETE in its entirety and **REPLACE** with attached, seven (7) pages

ITEM NO. 5 – Section 03300 – CAST-IN-PLACE CONCRETE

DELETE in its entirety and **REPLACE** with attached, ten (10) pages

ITEM NO. 6 – Section 04220 – CONCRETE UNIT MASONRY

DELETE in its entirety and **REPLACE** with attached, twelve (12) pages

ITEM NO. 7 – Section 05120 – STRUCTURAL STEEL

DELETE in its entirety and **REPLACE** with attached, six (6) pages

ITEM NO. 8 – Section 05400 – COLD FORMED STEEL FRAMING

DELETE in its entirety and **REPLACE** with attached, four (4) pages

ITEM NO. 9 – Section 05500 – METAL FABRICATIONS

DELETE in its entirety and **REPLACE** with attached, eight (8) pages

ITEM NO. 10 – Section 05520 – PIPE AND TUBE RAILINGS

DELETE in its entirety and **REPLACE** with attached, seven (7) pages

ITEM NO. 11 – Section 07620 – SHEET METAL FLASHING AND TRIM

DELETE in its entirety and **REPLACE** with attached, nine (9) pages

ITEM NO. 12 – Section 08100 – METAL DOORS AND FRAMES

DELETE in its entirety and **REPLACE** with attached, ten (10) pages

ITEM NO. 13 – Section 08330 – OVERHEAD COILING DOORS

DELETE in its entirety and **REPLACE** with attached, eight (8) pages

ITEM NO. 14 – Section 08700 – DOOR HARDWARE

DELETE in its entirety and **REPLACE** with attached, twenty four (24) pages

ITEM NO. 15 – Section 10170 – PLASTIC TOILET COMPARTMENTS

DELETE in its entirety and **REPLACE** with attached, five (5) pages

ITEM NO. 16 – Section 10800 – TOILET, BATH, AND LAUNDRY ACCESSORIES

DELETE in its entirety and **REPLACE** with attached, three (3) pages

ITEM NO. 17 – Section 11483 – INTERIOR SCOREBOARDS

DELETE in its entirety and **REPLACE** with attached, five (5) pages

ITEM NO. 18 – Section 11484 – EXTERIOR SCOREBOARDS

DELETE in its entirety and **REPLACE** with attached, five (5) pages

ITEM NO. 19 – Section 11680 – PLAYGROUND EQUIPMENT

DELETE in its entirety and **REPLACE** with attached, seventeen (17) pages

ITEM NO. 20 – Section 13120 – METAL BUILDING SYSTEMS
DELETE in its entirety and **REPLACE** with attached, fifteen (15) pages

ITEM NO. 21 – Section 15800 – VENTILATION

ADD in its entirety, ten (10) pages

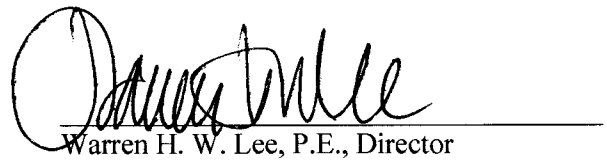
DRAWINGS

DELETE in its entirety Drawing Sheets:

GI001, GI002, GI003, G-001, G-002, G-401 (6 sheets); C-003, C-004, C-005, C-006, C-007, C-008, C-009, C-010, C-011, C-101, C-102, C-103, C-104, C-105, C-106, C-107, C-108, C-109, C-201, C-202, C-203, C-204, C-205, C-206, C-207, C-301, C-302, C-303, C-304, C-305, C-306, C-307, C-308 (33 sheets); L-101, L-104, L-105, L-106 (4 sheets); A-001, A-002, A-003, A-004, A-005 (5 sheets); PC001, PC101, PC102, PC103, PC201, PC202, PC402, PC403, PC405, PC513, PC514, PC601, PC602 (13 sheets); CB-101, CB102, CB103, CB601 (4 sheets); CS101, CS102, (2 sheets); AX101 (1 sheet); A-501, A-502, A-504 (3 sheets); S-CB001, S-CB002, S-CB101, S-CB201, S-CB302, S-CB303 (6 sheets); S-CS001, S-CS002, S-CS101, S-CS201, S-CS302, S-CS303 (6 sheets); S-PC001, S-PC101, S-PC201, S-PC301, S-PC302, S-PC303 (6 sheets); P-PC202, P-PC203 (2 pages); P-CB301, P-CB302 (2 pages); P-CS401, P-CS402 (2 pages); EGI001, EGI002, EGI003, EGI004, EGI005, EGI006, EGI007, EGI008 (8 sheets); E101, E102, E103, E104, E105, E106 (6 sheets); ECB101, ECB102 (2 sheets); ECS101 (1 sheet); EPC101, EPC102 (2 sheets); E501, E502, E601 (3 sheets) and **REPLACE** with attached revised 117 sheets.

ADD in its entirety Drawing Sheets:

C-013, C-110, C-111, C-112, C-500, C-501, C-502, C-503, C-504, C-505, C-506, C-507, A-508, M-G001, M-101, M-PC201, M-PC202, EGI009, E100, EPC103 (20 sheets).



Warren H. W. Lee, P.E., Director
Department of Public Works
County of Hawai'i

Date Issued: May 9, 2014

Please detach and execute the receipt below. Return immediately via facsimile (808) 961-8630 or mail to the Administration Office, Department of Public Works, County of Hawai'i at Aupuni Center, 101 Pauahi Street, Suite 7, Hilo, HI 96720-4224.

Receipt of Addendum No. 6 via website for the PĀHOA PARK MASTER PLAN PHASE I, Job No. PR-4234, Pāhoa, Puna, Hawai'i, is hereby acknowledged.

Signed _____ Title _____

Firm _____ Date _____

SECTION 02200 – EARTHWORK

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Furnish materials, labor and equipment required to accomplish all excavation, filling and grading as indicated on the drawings.

1.03 STANDARD SPECIFICATIONS AND SOILS REPORT

A. The report "Geotechnical Investigation Report, Pahoa Park (expansion) Master Plan-Phase I, Kuuhome Street, Pahoa, Hawaii" dated September 25th , 2013 prepared by Construction Engineering Labs, Inc. shall be a part of this specifications. A copy of the report is attached to this section. If there is any conflict between the project soils report and the Standard Specifications, Contractor shall follow all recommendation as provided in the project soils report.

B. Work shall be in accordance with the following sections of the County's "Standard Specifications for Public Works Construction" (SSPWC), dated September 1986 as revised, except as amended in the plans and specifications herewith. (Paragraphs concerning Measurement and Payment in the Sections are not applicable to this project.)

1. Clearing and Grubbing	Section 10
2. Trench Excavation and Backfill	Section 11
3. Roadway Excavation	Section 12
4. Structural Excavation and Backfill	Section 13
5. Rock for Fill	Section 14
6. Crushed Rock	Section 15
7. Borrow	Section 16
8. Embankment	Section 17

PART 2 – PRODUCTS

2.01 MATERIALS

A. Asbestos Prohibition: No asbestos containing materials or equipment shall be used under this section. The Contractor shall ensure that all materials and equipment incorporated in the project are asbestos-free.

B. General Fill Materials: Shall be well-graded soil or soil/rock mixture free from organic material and backfill, debris, other deleterious substances.

C. Cushion Fill: Under exterior and interior concrete slabs-on-grade shall be ASTM C33 Standard Size Aggregate Nos. 5, 6, 57 and 67.

D. Drain Rock: Shall meet the gradation requirements for ASTM C33 Standard Size Nos. 57 and 67.

E. Insufficient Earth Material: The Contractor shall import all necessary material to complete the grading work at no additional cost to the Owner. Such imported material shall be subject to the approval of the Director and shall meet the requirements as specified for each category of the materials.

F. Structural Fill Materials: Structural fill shall be well graded granular material, with particles 6 inches or less in maximum size and contain less than 20 percent particles passing the No. 200 sieve by weight. When placed in confined areas, such as utility trenches and footing excavations the maximum particle size shall be limited to 2 inches.

PART 3 – EXECUTION

3.01 PROTECTIVE MEASURES

A. All excavation shall be protected and guarded against danger to life, limb and property in accordance with applicable regulations.

B. Shoring, as required to safely preserve the excavations, existing electrical hand-hole boxes, earth banks, etc. free from damages resulting from the work, shall be provided and installed by the Contractor.

C. All excavations shall be kept free from standing water. The Contractor shall do all pumping and draining that may be necessary to remove water to the extent required in carrying on work. Grading shall be controlled so that the ground surface is properly sloped to prevent water run-off from entering open trenching excavations.

D. The Contractor shall conduct operations with minimum interference to park facilities, streets, driveways, sidewalks, passageways, traffic, etc.

E. The Contractor shall confine all work, equipment, materials and personnel as much as possible to the work area as indicated. The Contractor shall schedule all work that involves excessive noise, dust, dirt, or any other detrimental aspect of this work in order that there will be minimum disruptions to neighbors.

F. When necessary and when directed, the Contractor shall provide and erect barriers, etc. with special attention to the protection of personnel.

3.02 LAYING OUT

A. The laying out of baselines, establishment of grades and staking out the entire work shall be done by a Land Surveyor, licensed in the State of Hawaii, at the expense of the Contractor and he shall be solely responsible for their accuracy. The Contractor shall erect and maintain substantial batter boards showing construction lines and levels.

B. Should any discrepancies be discovered in the dimensions given in the plans, the Contractor shall immediately notify the Director before proceeding any further with the work; otherwise, he will be held responsible for any costs involved in corrections of construction placed due to such discrepancies.

3.03 SITE GRADING

A. All grading work shall be performed in conformance with County of Hawaii Ordinance 168, the applicable provisions of Chapter 54, Water Quality Control Standards, and Chapter 55, Water Pollution Control, of Title 11, Administrative Rules of the State Department of Health. In addition, the work shall be in conformance with the Air Pollution Control Standards and Regulations of the State Department of Health.

B. The area to be graded shall be cleared of vegetation, debris, rubbish, old pavements, abandoned pipelines and other deleterious materials. Trees and large masses of roots shall be grubbed. All of these materials shall be removed and disposed of properly off-site at no cost to the Owner.

C. No blasting will be permitted.

D. The areas not covered by concrete slab or pavement up to the Contract Zone Limits shall be graded to conform to finish contours with allowance for depth of top soil. Rough grading shall prevent the drainage of water into construction areas.

3.04 SITE PREPARATION

A. Prior to commencement of earthwork operations, all vegetation debris and other deleterious materials shall be removed from the site.

B. Building area, all CUT areas within the structural footprints shall be over excavated a minimum of two feet below the proposed footing bearing grade and to a minimum of ten (10) feet in a horizontal direction beyond the perimeter of the proposed structures. These areas should be ripped an additional 2 feet (4 feet below the proposed footing bearing grade. Ripped material shall not exceed 6” in diameter. All FILL areas should be ripped to a minimum depth of two feet and a minimum distance of 5 feet horizontally beyond the perimeter of the toe of the proposed slopes. The ripped material should be re-compacted to at least 95% relative density with a maximum particle size of 6”. The fill areas for the building pad should then be brought back to the proposed grades using 3- inch minus structural fill compacted to

at least 95% relative density. The building pad may be capped with a final 6 inch lift of 1-inch minus material.

C. Any underground structures such as cesspools, cisterns, septic tanks, well, pipelines, fuel tanks, etc. discovered in the site preparation work shall be removed and backfilled in accordance with these specifications and any applicable regulations.

D. All unsupported permanent cut slopes shall be constructed to an inclination of no greater than 1 horizontal to 1 vertical and a maximum height of 15 feet. Cut slopes that exceed the 15 feet in height shall have an 8 foot wide bench installed at mid-height of the slope.

3.05 PROBING AND GROUTING

A. The Special Inspector shall be present to observe grouting procedures on a full-time basis. All cost for their services shall be borne by the Contractor.

B. Probe holes shall have a diameter of at least 2 inches.

C. Depth of probing below the bottom of footings shall be 10 feet. The Special Inspector shall field verify the depth of each probe hole before any grout is placed.

D. One probe hole shall be made at each spread footing location. Probe holes shall not be spaced more than 10 feet on center along the length of continuous footings and 10 by 10 foot grids beneath structural slabs on grade. If cavities and/or voids are encountered or suspected during the probing operation, additional probes shall be drilled at closer spacing to aid in delineating the vertical and lateral extent of the cavity and/or void. The Special Inspector shall approve of any additional probe holes before they are drilled. Any loose areas on cavities disclosed during clearing and grubbing operations shall be excavated to expose firm materials and back filled with compacted structural fill.

E. Probe holes should be grouted with cement grout having a compressive strength of at least 1,500 pounds per square inch. A grout pipe shall be utilized and fully inserted to the bottom of the probe hole prior to pumping any grout. A maximum of 1 cubic yard of grout shall be pumped into a probe hole at any time. After that volume has been pumped, the grout shall be allowed to set, and then grouting in the same zone shall be attempted again. Grouting should continue 1 cubic yard at a time. The Special Inspector shall monitor the quantity of grout being placed.

F. In areas excessive grout take, it may be preferable to excavate the roof of the cavity and fill it with structural backfill, concrete, or some combination. Specific recommendations shall be obtained from the Contracting Officer for a particular situation encountered during construction.

G. All costs for probing and grouting shall be borne by the Contractor up to 2 cubic yards of grout material per hole. Grouting costs beyond this in cubic yards shall be considered a Change Order.

H. Probing and grouting shall be performed under the observation of the Special Inspector.

I. The probe drill shall be available on-site until the probing and grouting operations are completed. A longer lag time between probing/grouting operations and foundation construction may be required in the construction schedule.

3.05 FILLING AND BACKFILLING

A. Below Building

1. Soils shall be excavated to two feet below bottom of foundation and to a minimum distance of 5 feet horizontally beyond the perimeter of the toe of and proposed slope. Material beneath the building shall be ripped/ crushed to a diameter smaller than 6".

2. Grade shall be raised to bottom of foundation with 6- minus minus select borrow subbase compacted to 95% maximum dry density. A final 6 inch lift of 1- inch minus material may be used to cap off the building pad.

B. General fill slopes shall not be steeper than 2 horizontal to 1 vertical.

3.06 UTILITY TRENCH DIGGING AND BACKFILL FOR EXTERIOR ELECTRICAL WORK

A. Trench excavation for exterior electrical work shall be dug to depths shown on the drawings. If depths are not indicated, the trench shall be cut down to proper levels that will provide the minimum coverage to the ducts and required by the Code.

B. Trenching work shall be open cut excavation with banks as nearly vertical sufficient width to provide proper working space and bottom of trench accurately graded to provide uniform slope and support.

C. Backfill shall be General Fill and Backfill and compacted to 95% of maximum dry density as determined by ASTM D1557. Slightly mound the backfill above the finished grade to allow for settlement. See ELECTRICAL Section for duct-work requirements.

3.07 FILL TESTING

All fill shall be tested by geotechnical engineer or a designated testing agency for approval. All cost of testing shall be borne by the Contractor. Testing shall be made throughout the area for each compacted lift. All test results must be approved before the Contractor can proceed with placing of topsoil, cushion fill or base course. Should any testing fail, additional testing will be required at no cost to the County, at an enhanced frequency to be determined by the Director.

3.08 FINISH GRADING

Where finish grades and contours are not given, Contractor shall grade to provide drainage away from new and existing structures and shall provide good transitions into existing grades outside the grading limits.

END OF SECTION

SECTION 02361 – TERMITE CONTROL

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes the following for termite control:

1. Chemical soil treatment

B. Related Sections:

1. Section 02200 EARTHWORK

1.02 DEFINITIONS

A. EPA: Environmental Protection Agency

B. PCO: Pest Control Operator

1.03 SYSTEM DESCRIPTIONS

A. Chemical Soil Treatment: System consists of application of termiticide chemicals to exposed soil and to voids in construction where insects may gain entry to the building.

1.04 SUBMITTALS

A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Product Data:

1. Treatments

2. Application Instructions

3. Copies of EPA registered labels for all chemicals

C. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for state's record information, including the following as applicable:

1. Date and time of application

2. Moisture content of soil before application

3. Brand name and manufacturer of termiticide

4. Quantity of undiluted termiticide used

5. Dilutions, methods, volumes, and rates of application used

6. Areas of application

7. Water source for application

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: A PCO who is licensed by the Hawaii State Pest Control Board in Branch #3 and certified as a commercial applicator under the Hawaii Pesticide Law by the Hawaii State Department of Agriculture in category 7b and who is:

1. Chemical Soil Treatment: An experienced installer who has completed termite control treatment similar to that indicated for this project and whose work has a record of successful in-service performance.

B. Regulatory Requirements: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

1.06 COORDINATION

Coordinate termite control treatment application or installation with excavating, filling, and grading and concreting operations.

PART 2 – PRODUCTS

2.01 CHEMICAL SOIL TREATMENT

A. Termiticide: Provide an EPA registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatments solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA registered label.

B. Chemicals shall be aqueous solutions of Type I repellent termiticides such as Prelude, Dragnet SFR, Demon TC, or Prevail FT or the Type II non-repellent termiticide Premise 75. The chemicals shall be used in accordance with the labels and provisions related to the use of those pesticides as adopted by the Hawaii Pesticide Law, Chapter 149A, HRS, and the Federal Insecticide, Fungicide and Rodenticide Act.

1. Type II non-repellent termiticides such as Dursban TC shall not be used.

PART 3 – EXECUTION

3.01 EXAMINATION

Examine substrates, areas, and conditions, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with work only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.03 APPLYING CHEMICAL SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

1. A totalizing meter shall be provided to determine application rates and to indicate the total volume of pesticide applied in U.S. gallons. The meter shall be no more than five feet from the applicator at all times.

2. Slabs-On-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

a. Whenever possible, the solution shall be applied not more than 24 hours before the pouring of concrete over the affected area.

b. Where a treated area that is not scheduled to be covered with a vapor retarder moisture barrier in the finished construction (e.g., lanai area) cannot be covered with a poured concrete slab the same day, the area shall be protected with a waterproofing covering such as polyethelene sheeting.

3. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, piers, and chimney

bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.

a. Treatment shall include the provision of vertical barriers as stated on the product label.

4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

SECTION 02740 - SEPTIC SYSTEMS

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Whenever the Contractor is required by State or local laws or regulations to make a deposit and/or to pay for a permit before proceeding with any work called for under this part of the specifications. The Contractor shall make the necessary deposit and/or pay for obtaining the required permit for the work.

B. In addition, the following construction standards, with certain modifications as hereinafter specified, are hereby incorporated into and made a part of these specifications by reference and shall be applicable to all work performed by the Contractor under this section.

1. Specific Sections of the Counties' STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION dated September 1986 and STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION dated September 1984 as revised, except as amended in the plans and/or specifications herewith. Paragraphs concerning Measurements and Payments in the Sections are not applicable to this project.
2. Specific Sections of the INTERNATIONAL PRIVATE SEWAGE DISPOSAL CODE as adopted by the County of Hawaii.
3. Specific Sections of the State of Hawaii, Department of Health, Hawaii Administrative Rules Chapter 11-62, Wastewater Systems.

1.03 CERTIFICATION

The Contractor shall furnish to the Engineer, affidavits from the manufacturers of pipe, septic tank, fittings, etc., furnished and installed under this section verifying that such materials delivered to the project conform to the requirements of this specification.

PART 2- PRODUCTS

2.01 MATERIALS

A. Asbestos Prohibition: No asbestos containing materials shall be used under this section. The Contractor shall insure that all materials incorporated in the project are asbestos-free.

B. Materials for septic system shall be in accordance with the below listed sections of the Counties' STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION dated September 1986 and STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION dated September 1984 as revised, except as amended in the plans

and/or specifications herewith. Paragraphs concerning Measurements and Payments in the sections are not applicable to this project.

1. PVC Sewer Pipe and Appurtenances (SDR-35 or Approved Equal) Section 21

C. Septic Tank shall be H-20 Traffic rated, 4000-gallon concrete or ferro-cement septic tank lined with approved water proofing coating specifically formulated for wastewater applications, high performance polyurea or polyurethane coating. Waterproof coating may be factory applied or field applied by a manufacturer certified applicator. Each septic tank shall have a minimum of two 24" minimum diameter access holes. All inlet and outlet pipe shall be watertight sealed with gaskets and/or sealants to the septic tank.

D. Soil replacement shall be 3/8" minus cinder or 3/8" minus cinder soil.

E. Drain rock shall be 3/4" - 1/2" rinsed clean with no fine dust.

F. The soil absorption bed shall be construction with Standard Infiltrator Chambers as manufactured by Infiltrator System Inc. or pre-approved equivalent.

G. Distribution Boxes shall be rated as specified per plans

PART 3 – EXECUTION

3.01 INSTALLATION

A. Location and Adjustment of Existing Utility Lines: The Contractor shall be responsible for precisely laying out the septic system shown on the contract drawings as provided elsewhere in these specifications. The locations shown on the contract drawings of the various utility lines which the new lines are to cross over or under or connect to, be determined on the basis of the best information available; however, no assurance can be provided that the actual locations will be precisely as shown on the contract drawings.

1. In performing all work, the Contractor shall exercise due care and caution necessary to avoid any damage to and impairment in the use of any existing utility line. Any damage inflicted on existing lines resulting from the Contractor's operations shall be immediately repaired and restored as directed by the Engineer at the Contractor's expense.
2. Trench excavation and backfill for the laying and installation of sewer pipes and leaching field, to the required line and grade and structure excavation for

B. The construction of the appurtenant utility structure shall be governed by the following sections of the DPW STANDARD SPECIFICATIONS as herein before amended with respect to Measurements and Payments and with certain additional modifications noted below:

1. Trench Excavation and Backfill Section 11
2. Structure Excavation and Backfill Section 13
3. Sewer Manhole – Frame and Cover Section 23
4. Restoring Pavements and Other Improvements Section 38

C. Surplus material resulting from trench and structure excavation shall be used by the Contractor for backfilling, filling and grading to the extent required as specified elsewhere in these specifications. The Contractor, in performing any work within the Contract Zone Limits shown on the contract drawings, shall exercise due care to keep to an absolute minimum any damages to existing improvements, including plants and shrubs. The Contractor shall be responsible for repairing, replacing and/or restoring all damages to existing improvements to the satisfaction of the Engineer.

D. Contractor shall coordinate percolation test for each field with the Owner before the entire beds are excavated. Tests shall be paid for by the Owner.

E. Absorption Bed Construction: The trench shall be constructed to the line and grade shown on the plans or as directed by the Engineer. Extreme care shall be exercised in placing the 3/8" cinder soil replacement drain rock, laying the pipe, and backfilling, so that there will be no mixing of the excavated material with the filter material.

F. The Contractor shall schedule a bed test of the absorption bed after the excavation is complete and before any installation of the soil replacement. No work shall be done on the absorption bed until written authorization to proceed from the design engineer is received.

    1. The Contractor shall supply the necessary equipment such as hoses and water for the test. The test will require a minimum of two thousand gallons of potable water or 2 times the capacity of the septic tank, whichever is greater.
    2. A preliminary inspection shall be required for the system prior to any backfilling.

G. Final Inspection: At the time of final inspection of the work performed under the contract, the septic system covered by this section shall be complete in every respect and operating as designed. All surplus material of every character resulting from the work of this section shall have been removed. The septic system shall be free from sand, silt or other obstructions. There shall be no low points over the absorption bed for ponding of any rainfall runoff. Any defect discovered in the utilities subsequent to this inspection shall be corrected prior to final acceptance.

END OF SECTION

SECTION 02821 – CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

Furnish materials, labor, and equipment necessary to install all chain link fences and gates to the limits shown and as detailed on the plan and as specified herein. All materials shall be new, specifically purchased for this project.

1.03 SUMMARY

A. Section Includes:

1. Fence framework, fabric, and accessories.
2. Excavation for post bases.
3. Concrete foundation for posts and center drop for gates.
4. Manual gates and related hardware.
5. Gate locking devices.

B. Related Sections:

1. Division 3: Concrete: Concrete foundation and grout.
2. Division 5: Metal flanges and anchor bolts.

1.04 DEFINITIONS

A. Terminology shall be as defined in CLFMI-Product Manual.

B. Additional terminology shall be as defined in ASTM F552.

1.05 SYSTEM DESCRIPTIONS

A. Fence Height: 6 feet nominal, unless indicated otherwise on drawings.

B. Line Post Spacing: As indicated on drawings, at intervals maximum 10 feet.

C. Fence Post and Rail Strength: Conform to ASTM F1043 "Heavy Industrial Fence" quality.

D. Manual gates.

1.06 SUBMITTALS

A. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, and schedule of components.

B. Product Data: Submit data on fabric, posts, accessories, and fittings.

C. Samples: Submit samples of fence fabric illustrating construction and colored finish.

D. Manufacturer's Installation Instructions: Submit installation requirements.

1.07 CLOSEOUT SUBMITTALS

Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines or easements.

1.08 QUALITY ASSURANCE

A. Supply material in accordance with CLFMI -Product Manual.

B. Perform installation in accordance with ASTM F567.

C. Maintain one copy of each document on site.

1.09 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three 3 years experience.

B. Installer: Company specializing in performing work of this section with minimum three (3) years experience.

1.10 DELIVERY STORAGE AND HANDLING

A. Deliver, store, protect and handle products with adequate protection against damage.

B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.

C. Identify each package with manufacturer's name.

D. Store fence fabric and accessories in secure and dry place.

1.11 COORDINATION

Coordinate work with work of others.

1.12 WARRANTY

Provide warranty for minimum two (2) years for chain link fence installation. Include coverage for PVC coating against delaminating, cracking, crazing, blistering, peeling, chalking or fading.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Anchor Fence Inc.

B. Cyclone Inc.

C. Merchants Metals Division of MMI Products, Inc., or approved equal.

2.02 MATERIALS

A. Chain Link Fence Fabric shall be 2-inch mesh, 9ga core, 8ga finish PVC fuse bonded, galvanized and conform to ASTM A392, Class 1. The hot-dipped galvanized fabric shall contain not less than 1.2 ounces per sq. ft. of uncoated wire surface as determined by stripping test ASTM A90 and under the PREECE Test (ASTM A239), shall withstand 6 or more 1-minute dips before reaching the end point. All fabric shall be free from barbs, icicles, or other hazardous projections resulting from galvanizing. PVC color shall be green.

B. Tie Wire shall be 9 gauge (9 gauge for gates) soft aluminum wire as called for on plans.

C. Tension Bar shall be 1/4" thick by 3/4" wide galvanized mild steel bar for attachment of fabric to terminal posts.

D. Brace Band shall be formed from galvanized steel bands at least 1/8" thick by 3/4" wide.

E. Tension Band shall be formed from galvanized steel bands at least 12 gauge thick by 3/4" wide.

F. Tension Rod shall be a 3/8" dia. mild steel galvanized rod threaded at one end and hooked 180 degrees at the other.

G. Fittings:

1. Post Cap and Eye Top shall be of one-piece hot-dip galvanized cast iron construction and shall attach securely onto their respective posts.

2. Coupling for top rails shall be outside sleeve type, galvanized, at least 6 inches long and crimped at center.

3. Rail Ends shall be snug, one-piece fittings for top and brace rails with holes to receive 5/16" bolts for securing to rail end bands.

4. Double Rail End shall be similar to rail end except for an additional ½" hole to receive the hooked end of a tension rod.

H. Composition and Finish of Metal Parts: All metal parts and fittings, including tracks, gate hardware and frames, shall be of steel, malleable iron or wrought iron, and shall be galvanized by the hot-dip process, after fabrication, in conformance with ASTM A153. The coating on all parts shall be continuous and smooth; that is, free from barbs, icicles, or other projections. Bolts may be cadmium-plated in conformance with ASTM A165 instead.

I. Posts, Rails, and Braces shall be of standard weight, hot-dipped galvanized, welded and seamless steel pipes conforming to ASTM A120. Size, length, and painted as shown on

the drawings, or when not indicated there on, as specified in section 54, Chain-link Fence, in the Standard Specifications for PW Construction.

J. Tension Wire shall be of 7-gauge coiled spring galvanized wire.

2.03 COMPONENTS

A. Line Posts: Per C&C of Honolulu Department of Parks and Recreation standard details

B. Corner and Terminal Posts: Per C&C of Honolulu Department of Parks and Recreation standard details

C. Top, Intermediate and Bottom Rail: Per C&C of Honolulu Department of Parks and Recreation standard details

D. Tension Wire: Per C&C of Honolulu Department of Parks and Recreation standard details

E. Stretcher Bar: Per C&C of Honolulu Department of Parks and Recreation standard details

F. Truss Rod with Turnbuckle: Per C&C of Honolulu Department of Parks and Recreation standard details

G. Tie Wire: Per C&C of Honolulu Department of Parks and Recreation standard details

2.04 ACCESSORIES

A. Caps: Ball type, cast steel galvanized, or malleable iron galvanized, size to post diameter, set screw retainer.

B. Extension Arms: Galvanized pressed steel, PVC coated, to accommodate 3 strands of barbed wire, single arm, sloped 45 degrees.

C. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.

D. Gate Hardware: Center gate stop and drop rod, gate hinges for each leaf and hardware for padlock.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of work means installer accepts existing surface and substrate conditions.

3.02 INSTALLATION AND WORKMANSHIP

A. General:

1. Install framework, fabric, accessories and gates in accordance with ASTM F567 and as noted on drawings.

2. Metal fencing and gates of the various types called for shall be erected in strict conformance with the plans and these specifications. The gates and hardware shall provide intended freedom of operation. Posts shall be plumb and in-line. Welding shall be done in accordance with latest AWS standards. However, no splicing of posts, rails, or braces shall be accepted. Where changes in-line occur with an angle of deflection of 30 degrees or more, the change point will be considered a corner and a corner post shall be installed thereat. End, corner, and gate posts for fences with 5-foot and wider fabric shall be braced to the nearest line post with horizontal braces and tension rods. The horizontal braces shall be spaced midway between top rail and ground and securely fastened to posts as shown on plans. Where fencing is placed along a curve with radius of 50 feet or less, horizontal braces (and tension rods) shall be installed between all posts in like manner. Pull posts, at maximum intervals of 100 feet, shall be braced and trussed in both directions as specified above.

3. Field Touch-Ups: Field welds shall be cleaned of flux and spatter and all damaged galvanizing removed, all hazardous projections ground off, properly prepared, and then heavily coated with self-curing inorganic zinc coating. Manufactured coatings shall be applied in strict accordance with manufacturer's printed specifications. Damage to existing painted surfaces shall be touched up.

B. Post and Rail Installation:

1. Fence posts, except as otherwise indicated or specified per the Architectural drawings, shall be spaced not more than 10 feet apart. In curved fence sections having a radius of 50 feet or less, the posts shall be placed as shown on the plans. Line posts shall be set so that top of the eye tops shall be at the same height as the fence fabric. Post caps shall be secured in place either by spot welding, S.S. tamper proof set screw, or S.S. setting pin.

2. Allow concrete to cure for minimum seven (7) days before installing fabric and other materials attached to posts.

3. Install posts with 6 inches maximum clear opening from end posts to buildings, fences and other structures, unless indicated otherwise.

4. Set intermediate and terminal posts plumb in concrete footings or concrete walls, as shown on drawings.

5. Line Post Footing Depth Below Finish Grade: Follow ASTM F567, unless indicated otherwise.
6. Corner and Terminal Post Footing Depth Below Finish Grade: Follow ASTM F567, unless indicated otherwise.

7. Top rails shall pass through and bear firmly on base of eye tops, form a continuous brace from end to end of each stretch of fence, and be securely fastened to terminal posts with rail ends and brace bands. Coupling for the top rails shall be installed at intervals of 24 feet maximum.

8. Install center and bottom brace rail on corner gate leaves.

9. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

10. Install top rail through line post tops and splice with 6 inch long rail sleeves.

11. Install bottom rail through line post and splice with 6 inch long rail sleeves.

C. Chain-Link Fabric Installation:

1. Chain link fabric shall be fastened on the side of the posts as designated, and shall be mounted on the posts so that the bottom of the fabric will be no more above the finished grade than called for on the plans. High points of the ground shall be excavated as necessary. The fabric shall be stretched taut and securely fastened to the posts. Ends of wire ties shall be bent back so as not to be a hazard. Between posts the top edge of the fabric shall be fastened to the top rail and the lower edge to the tension wire with tie wire of size and at spacing as called for on the plans. Tension wire shall be stretched tight and shall be installed in a straight line between posts. Tension bars extending the full height of the fence, and tension bar bands shall be used for fastening fabric to end, corner, pull, and gate posts. Bolted tension bar bands shall be placed at top and bottom of tension bars and spaced at 14-inch intervals max. Fastenings to line posts shall be made with tie wire of size and spacing as called for on the plans.

2. Do not stretch fabric until grout for sleeves has cured 14 days.

3. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

4. Fasten fabric to top, intermediate and bottom rails, line posts, truss rods, stretcher bars and with tie wire at maximum 15 inches on centers, unless shown otherwise.

5. Attach fabric to end and corner posts with stretcher bars and stretcher bar clips.

3.03 ERECTION TOLERANCES

A. Maximum Variation From Plumb: *1/4* inch.

B. Maximum Offset From Indicated Position: 1 inch.

C. Minimum distance from property line: 6 inches.

3.04 ADJUSTING

Adjust gates for smooth and balanced operation.

3.05 FINAL CLEAN-UP

All exposed metal surfaces shall be clean and free of cement. All surplus earth resulting from metal fencing work that is not used in the grading work shall be cleaned up and

disposed of at location specified on plans. All debris resulting from work of this section shall be removed from the site.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 STORAGE OF MATERIALS

Cement and aggregate shall be stored in such a manner as to prevent their deterioration or the intrusion of foreign matter. Any material which has deteriorated or which has been damaged shall not be used for concrete and shall be promptly removed from the site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement shall conform to the requirements of ASTM C150, Type I or Type II, for all concrete work.

B. Concrete Aggregates

1. Fine Aggregates shall be calcareous or basalt sands, or a combination thereof. They shall meet the grading requirements of ASTM C33 unless the concrete producer can provide past data that shows that a proposed non-conforming gradation will produce concrete with a required strength and suitable workability.

2. If manufactured sands are used in the concrete mix, the Contractor may select and use a water-reducing and/or an air-entraining admixture as specified hereinafter to provide satisfactory workability in the concrete. The cement content of a mix shall be as specified hereinafter, and the use of an admixture shall in no way result in the reduction of the cement factor.

3. Coarse Aggregate shall be crushed close-grained, blue lava rock meeting the grading requirements of sizes 67 (ASTM D448). The maximum size of aggregate shall not be larger than 1/5 of the narrowest dimensions between sides of the forms of the member for which the concrete is to be used nor larger than 3/4 of the minimum clear spacing between individual reinforcing bars or bundles of bars.

C. Water used in mixing concrete shall be fresh, clean and drinkable.

D. Expansion joint filler shall be pre-molded material of 1/2" thickness, unless otherwise noted, composed of fiberboard impregnated with asphalt.

E. Joint sealing compound shall be a polysulfide or urethane compound or other approved equal. Color to be selected by the County.

F. Bond-break filler shall be mineral-surfaced roofing cap sheet or coated asphalt felt.

G. Non-slip grit shall be an abrasive aggregate of silicon carbide or aluminum oxide.

H. Admixture is used, shall conform to ASTM C494 or ASTM C260 and shall be mixed in proper amount in accordance with directions of manufacturer.

I. Curing compound shall conform to ASTM C309.

J. Moisture barrier shall be of polyethylene film, minimum 0.010" thick.

K. "Keyed Kold Joint" shall be galvanized.

PART 3 - EXECUTION

3.01 DESIGN OF CONCRETE MIXES

A. Ingredients for concrete shall be Portland cement, fine and coarse aggregate and water.

B. Normal weight concrete shall meet the requirements outlined below.

C. Concrete shall be designed so that the concrete materials will not segregate nor caused excessive bleeding. Slump shall be 4 inches or less if consolidation is to be by vibration, and 5 inches or less if consolidation is to be by other methods. A tolerance of 1" above the indicated maximum will be allowed for individual batches.

D. For concrete used in ramps or other sloping construction, the slump tolerances shall be waived.

E. For each class of concrete up to Class 4,000, the cement content and the test results for 28-day compressive strength shall meet the following requirements:

28-Day Compressive Strength Test Results

Class	Min. Cement Contents Per Cubic Yards,Sacks	Min. Average for 3 Cylinders,psi	Min. Average for 2 Cylinders,psi
A (3,000 psi)	5.50	3,000	2,750
B (2,500 psi)	5.00	2,500	2,250

G. The Contractor shall use only approved mixes.

H. Unless otherwise noted, Class 3,000 concrete shall be used for building slab-on-grade, footings, and equipment pads on grade; Class 2,500 concrete for concrete walks.

3.02 JOINTS

A. Construction joints shall be provided as detailed at locations indicated on the plans. Construction joints not shown on the plans shall be so made as to least impair the strength of the structure and shall be approved by the Director. In general, they shall be located near the middle of the spans of slabs, beams and girders unless a beam intersects a girder

at this point, in which case the construction joints in the girders shall be offset in distance equal to twice the width of the beam. Joints in columns and walls shall be at the underside of floors, slabs, beams or girders and at the top of footings or floor slabs. Beams, girders, brackets, column capitals, haunches and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement. Contractor shall submit plans showing locations of construction joints other than those shown on the plans.

B. All reinforcing steel shall be continuous across construction joints. Keys and/or inclined dowels shall be provided as required. Longitudinal keys at least 1-1/2" deep shall be provided in all joints in walls and between walls and slabs or footings.

C. Expansion joints shall be provided as detailed at locations indicated on the plans. Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors or walls bonded on only one side of joint) shall not be permitted to extent continuously through any expansion joint.

D. Control joints shall only be provided as detailed at locations indicated on the plans. When saw-cut joints are permitted, cutting shall be timed properly with the set of the concrete. In any case, cutting shall be started not later than 24 hours after the concrete is placed.

3.03 MIXING CONCRETE

A. All concrete throughout shall be either job or plant mixture in any approved type of power operated mixer that will insure uniformity and homogeneity of the concrete produced. Contractor shall provide a sufficient number of mixers to continuously carry on the work.

B. Mixing at jobsite shall be done in accordance with ACI 614 and as follows:

1. Concrete shall be thoroughly mixed in a batch mixer of an approved type and size which will insure a uniform distribution of materials throughout the mass. The machine shall have a control device to prevent materials from being discharged until they have been mixed for the specified minimum time.

2. The entire contents of the drum shall be discharged before materials of the succeeding batch are placed therein. No mixer shall be used which has a rated capacity of less than a 1-sack batch and no mixer shall be charged in excess of its rated capacity.

3. The first batch of materials placed in the mixer after the machine has been cleaned shall contain a sufficient excess of cement, sand and water to coat the inside of the drum without reducing the required mortar content of the mix. Upon cessation of mixing, the mixer shall be thoroughly cleaned.

C. Ready-Mixed and Mixed-In-Transit Concrete shall be mixed to conform to the provisions of ASTM C94 and as follows:

1. The plant shall have sufficient capacity and transportation equipment to deliver concrete at the rate desired. The interval between batches for a pour shall not exceed 30 minutes.

   The time elapsed between the introduction of the mixing water to the cement and aggregates or the cement to the aggregates, and the placing of concrete in its final position shall not exceed 90 minutes.

2. In hot weather (more than 90 degrees F) or under conditions contributing to quick stiffening of the concrete, the elapsed time shall not exceed 60 minutes, if no retarding admixture is used. If an ASTM C-494 Type B or D admixture is added to the concrete, the elapsed time shall remain at 90 minutes.

3. Concrete shall be mixed only in such quantity as is required for immediate use. No re-tampering will be permitted and concrete that has started to harden will be discarded and promptly removed from the job.

D. Admixtures may be used in the concrete as recommended by the supplier and approved by the Director.

E. Hand mixing of concrete will not be permitted, except to make up shortages for fence post footings, sidewalks, thresholds, curbs and gutters and thrust blocks.

3.04 PLACING CONCRETE

No concrete shall be placed in the absence of the Director or his representative who shall be given 24 hours advance notice of starting time of concrete pour. Place no concrete until foundation, forms, steel, pipes, conduits, sleeves, hangers, anchors, inserts, waterproofing, termite treatment and other work required to be built into or placed ahead of concrete placing have been inspected and approved by the Director. Concrete placed without such notice and approved shall be rejected.

A. Preparation

1. All sawdust, chips and other construction debris and extraneous matter shall be removed from interior of forms. Struts, stays, bracings, or blocking serving temporarily to hold forms in correct shape or alignment shall be removed when the concrete placing has reached an elevation rendering their service unnecessary.

2. Concrete shall be placed upon clean, damp surfaces, with no free water, or upon properly compacted fills, but never upon soft mud or dry, porous earth. Before pouring footings or foundations, bottoms of excavation shall be properly leveled off and tamped.

3. Before depositing new concrete on or against concrete which has set, all accumulations of mortar splashed upon reinforcing steel and the surfaces of forms shall be removed and the forms shall be retightened. The surfaces of previously set concrete shall be thoroughly roughened and cleaned of all foreign matter and laitance, saturated with water and slushed with a coat of cement grout. New concrete shall be placed before the grout has attained its initial set.

B. Conveying

1. Concrete shall be conveyed from mixer to form as rapidly as practicable by methods that will prevent segregation.

2. Concrete shall be deposited as nearly as practicable in its final position. Extensive spading as a means of transportation shall be avoided and in no case shall vibrators be used to transport concrete inside the forms.

3. Open troughs and chutes shall have a slope not to exceed 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 ft. long and chute not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

4. The concrete shall not be allowed to drop freely more than 6 feet except where specifically authorized by the Director. When placing operations would involve the dropping of concrete from a height of more than 6 feet, it shall be conveyed through pipes or flexible drop chutes.

5. If any appreciable segregation occurs through the conveying methods employed, their use shall be ordered discontinued by the Director and some other satisfactory method of placing concrete shall be used.

6. All chutes, troughs, pipes and other means of conveyances shall be kept clean and free from coatings of hardened cement or concrete by thoroughly cleaning with water and chipping after each pour. Water used for flushing shall be discharged away from the vicinity of the concrete or forms already in place.

C. Depositing

1. Unless adequate protection is provided, concrete shall not be placed during rain. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish. Fresh concrete that has been deposited but has not attained its initial set shall be protected in the event of rain.

2. Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcing. As nearly as practicable, the concrete shall be dropped vertically without hitting the reinforcement, sleeves or forms into its final position in order to avoid separation of coarse aggregates from concrete. After the initial set of concrete, the forms shall not be jarred and no strain shall be placed on the projecting reinforcing.

3. Formed concrete shall be deposited in horizontal layers not deeper than 2 feet avoiding inclined layers and inclined construction joints. The depth of layers shall be shallow enough so that the succeeding layer will be placed before the previous layer has attained its initial set. Concrete shall not be allowed nor shall it be caused to flow horizontally or on slopes in the form. Concrete placing on a slop shall begin at the lower end of the slop and progress upward.

4. Construction joints shall be made only where located on the plans unless approved otherwise by the Director. Pours shall be planned to provide for the continuous placing of concrete from one construction joint to another. The face edges of all joints that are exposed to view shall be carefully finished true to line and elevation.

5. In slab construction, placing of the concrete shall be started at the far end of the work so that each batch will be dumped against previously placed concrete, not away from it. The concrete shall not be dumped in separate piles and the piles then leveled and worked together. For slabs on earth, additional requirements apply.

6. If depositing of concrete must be stopped short of a full placement, it shall be leveled to

a horizontal plane or stopped against a vertical bulkhead. Such bulkhead or horizontal plane shall be located only as approved by the Director.

D. Compaction

1. All concrete shall be consolidated by vibration so that the concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. All compaction shall be done by use of high frequency internal vibrators. Where the vibrator cannot be inserted into the concrete, compaction shall be done by spading, rodding or forking.

2. Frequency of vibrator shall not be less than 7,000 impulses per minute. The Contractor shall provide a sufficient number of vibrators to properly consolidate all concrete immediately after placing. At least one standby vibrator shall be on hand at all times during the placement of the concrete.

3. Vibration shall not be applied through contact with reinforcement or forms. Vibration shall penetrate previously deposited concrete sufficiently to prevent pockets or voids or construction joints from occurring between pours, but must not be applied to concrete which has set up sufficiently to cease to be plastic under vibration.

3.05 FLOOR SLABS ON EARTH

A. Concrete floor slab on earth shall be placed over a cushion or base coarse fill as specified in another section. Floor slab shall not be placed until termite soil treatment has been applied. Termite soil treatment shall be applied at the maximum rates by an operator licensed to control ground termites.

B. All earth-supported slabs, with the exception of sidewalks, shall be reinforced with Grade 40 #4 steel reinforcing bars at 18” o.c. each way for 5” thick concrete slabs and Grade 40 #3 steel reinforcing bars at 16” o.c. each way for 4” thick concrete slabs. Concrete walks and sidewalks shall be reinforced with 6”x6” W1.4XW1.4 galvanized wire fabric. Plain bar dowels shall be provided as detailed for construction and expansion joints. Such dowels shall be wrapped or greased on one side of the joints to prevent bonding.

C. Care shall be taken in handling and placing the reinforcement as follows:

1. Reinforcing fabric shall not be rolled over by trucks, buggies or wheelbarrows, nor trampled to the extent that it is bent out of the plane of the fabric. Material which has been so bent that it cannot be laid out flat shall be rejected.

2. Reinforcing steel and fabric shall be positively set, either prior to or during the placement of concrete, to the level(s) required within the slab(s) as indicated on the plans or as otherwise called for herein.

D. Floor slabs shall be placed in alternate panels, long strip pattern, following construction, expansion or control joints. Narrow contraction/control joints shall be provided transverse to the length of the cast strips. There shall be an interval of at least 2 days between the placing of the initial panels and that of the adjacent ones. "Key Kold Joint" may be used in lieu of placement in alternate panels in areas where floor covering is specified provided all shrinkage cracks are sealed prior to installation of floor covering.

E. A bond-break filler shall be provided where edge of slab abuts any vertical surface and where indicated on plans. Width of filler strips shall equal depth of floor slab.

F. Expansion joints with expansion joint filler shall be provided at locations indicated on plans.

G. Expansion joints shall be sealed with joint sealing compound at least 3/8" deep.

3.06 CONCRETE WALKS ON GROUND

A. Concrete walks shall be of one lift construction 4 inches in thickness with thickened edge, and of Class B (2,500 psi) concrete.

B. Expansion joints with expansion joint filler shall be provided not more than 32 feet apart; at junctions with curbs, where walks abut building, platform and other fixed structures; and elsewhere as shown in the plans. Walks shall be finished as indicated hereinafter and scored where shown or called for on plans.

C. Control joints which shall be provided where shown on the plans, may either be formed-in-place or saw cut. Joints shall be a minimum of 1/8" wide and 1/6 the depth of the slab, and shall be sealed with joint sealing compound.

D. Concrete shall be tamped and screed true to grade and section, sufficient mortar brought to the surface for finishing, and the required finish given as specified hereinafter before the concrete sets. Steps in connection with walks shall have same finish as walks. All edges except for those at saw-cut control joints shall be rounded to 1/8" radius. Cross slope for or crowned walks shall be 5/32" per foot. No pedestrian traffic shall be permitted on concrete walks for a period of 3 days after placing. Expansion joints shall be sealed with joint sealing compound at least 3/8" deep.

3.07 FINISHING OF SLABS

A. Finish A - Light Troweled Finish

1. After the concrete has been placed, struck off, consolidated and leveled, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared and/or when the mix has stiffened sufficiently to permit the proper operation of power-driven float.

2. The surface shall then be consolidated with power-driven floats of the impact type except in thin sections. Hand floating with wood or cork-faced floats shall be used in locations inaccessible to the power-driven machine. The slab shall then be steel troweled to a uniform, smooth texture.

B. Finish B - Broom Finish

1. After the concrete has been placed, struck off, consolidated and leveled, the concrete shall be roughened with a broom/ brush before final setting.

C. Finishing Tolerances for slabs shall be true planes within 1/8" in 10 ft., as determined by a 10 ft. straightedge placed anywhere on the slab in any direction.

3.08 SELECTION OF FLOOR FINISHES

Unless otherwise indicated on the drawings, the following floor finishes shall be used.

A. Finish A - Troweled Finish: For interior surfaces.

B. Finish B - Broom Finish: Surface beneath Solid Polypropylene Athletic Court Tiles.

3.09 REPAIR OF DEFECTS

A. After forms have been removed, any concrete which is not constructed as shown on the plans or which is out of alignment or level beyond required tolerances or which shows a defective surface which in the opinion of the Director cannot be properly repaired or patched shall be removed.

B. Where cast-in-place concrete which is exposed to view or designated architectural requires repairing or patching, the texture of the surface of such repair or patch shall closely match that of the surrounding surface. If the concrete is to remain unpainted, the surface color shall also be loosely matched to that of the surrounding surface.

C. All tie holes and all repairable defective areas shall be patched immediately after form removal as follows:

1. All honeycombed concrete shall be chipped out to sound concrete but in no case to a depth of less than 1 inch. If possible, edges of the chipped-out areas shall be undercut.

2. Rock pockets, form tie holes, deep holes not too large in area, other holes with relatively high ratio of depth to area, and similarly confined areas shall be dry packed.

3. After the area to be patched has been thoroughly cleaned and dampened, the mortar, which shall consist of 1 part cement, 2-1/2 parts sand passing a #16 screen and only enough water to produce a mortar that will stick together upon being molded into a ball by slight pressure of the hands, shall be placed in the hoes in layers having a compacted thickness of about 3/8". Each such layer shall be solidly rammed over its entire surface using a hardwood stick and a hammer.

4. Shallow depressions where lateral restraint cannot be obtained, voids behind reinforcement, and holes extending through concrete sections shall be patched using a commercially prepared bonding agent, a stiff mortar mix of 1 part cement and not more than 2-1/2 parts sand.

5. For filling holes in exterior surfaces, an epoxy bonding agent shall be used. Application of the bonding agent shall be in strict conformance with the manufacturer's instructions.

3.10 SURFACE FINISHES

A. Plywood Finish

Finish of all exposed surfaces cast against forms constructed of plywood or lined with

"Plyform" shall be true to line and plane within the tolerances in Section 03100.

1. Joint marks and fins shall be removed and surfaces left smooth, dense and free from prominent grain markings.

2. The surface shall be scrubbed to remove any laitance or loose particles and to expose any defects.

3. Tie holes, honeycombing and defects shall be repaired in accordance with these specifications.

4. The surface shall be thoroughly wetted. Then, as the concrete approaches surface dryness, a mortar consisting of 1 part Portland cement, 2 parts well-graded sand passing a No. 30 sieve, and enough water to provide the consistency of thick paint shall be vigorously rubbed over the area with clean burlap pads so as to fill all voids.

5. While the mortar is still plastic but partially set so that it cannot be easily pulled from the voids, the surface shall be rubbed again with a dry (no water) mortar mix of the same proportions as above.

6. Burlap pads, stretched tightly around a board to prevent dishing the mortar in the voids, shall be used for this operation. There shall be no discernible thickness of mortar on the surface, except in the voids, when this operation is concluded.

7. Immediately following the rubbing treatment, the surface shall be continuously moist-cured for 72 hours.

3.11 LOCATION OF SURFACE FINISHES

A. Unless otherwise indicated on the drawings, the location of formed surface finishes shall be as follows:

   1. Plywood Finish - All exposed concrete surfaces unless otherwise noted.

3.12 CURING AND PROTECTION

All concrete shall be cured for a period of not less than 7 days by one of the approved methods listed below. During this curing period, the concrete shall be maintained with minimal moisture loss at a relatively constant temperature. Fresh concrete shall be protected from heavy rains, flowing water, mechanical injury and injurious action of the sun. Curing method selected must be compatible with the finish to be applied to the concrete.

A. Curing shall immediately follow the finishing operation.

B. Water Curing: If cured with water, concrete shall be kept wet by mechanical sprinklers, by ponding,or by any other approved method which will keep the surfaces continuously wet.

C. Saturated Sand Curing: Surfaces cured with sand shall be kept covered with a minimum of 1-inch thickness of sand which shall be kept uniformly distributed and continuously saturated during the entire curing period.

D. Curing Compounds: Curing compounds shall not be used on concrete surfaces that are to

receive paint finish, acid stain or resilient flooring, except those that are recommended by the manufacturer to be compatible with the applied finish. Application shall be accordance with the manufacturer's recommendations. If curing, sealing or other compounds are used which are incompatible with applied finish, such compound shall be thoroughly removed by grinding with a terrazzo grinder.

E. Waterproof Paper: Waterproof paper or opaque polyethylene film conforming to ASTM C171 may be used. The paper of film shall be anchored securely and all edges sealed or applied in such a manner as to prevent moisture escaping from the concrete. Waterproof paper shall not be used on floors that will be exposed when finished.

3.13 CONCRETE FOR ELECTRICAL WORK

A. Unless otherwise noted on plans, concrete for handholes and manholes shall be 3,000 psi strength at 28 days. Concrete for encased ducts shall be Class 2,500. Maximum size of aggregate for concrete encased duct shall be 3/4".

B. All ducts shall have a minimum cover of 3 inches of concrete. Spacers shall be used for placing the ducts and for rigidly holding the ducts during the concrete pour. Provide minimum earth cover of 18 inches over top of concrete encasement unless otherwise shown on plans.

C. The encased section of ducts to which a future connection is to be made shall end with a coupling. An unencased 1-foot section of duct and end cap shall constitute the terminus of such ducts.

3.14 CONCRETE FOR DRAINAGE, SEWER AND PLUMBING SYSTEMS

A. Unless otherwise noted on plans, all concrete required for construction of manholes, catch basins, foot baths, valve boxes, etc., which are required for plumbing and drainage installation shall be Class 3,000.

B. Normal weight concrete containing calcareous aggregates shall not be used in sewerage structures and/or components.

C. Sewer manholes shall be constructed in accordance with Section 23 SEWER MANHOLES of the "STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION" dated May 1975, as amended. (Paragraphs concerning Measurements and Payments in this Section are not applicable to this project.

3.15 CLEAN-UP

The Contractor shall clean-up all concrete and cement materials, equipment and debris upon completion of any portion of the concrete work when so directed by the County and upon completion of the entire concrete and related work.

END OF SECTION

SECTION 04220 – CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Miscellaneous masonry accessories.

1.02 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

C. Samples for Verification: For each type and color of the following:

1. Decorative CMUs.
2. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
3. Accessories embedded in masonry.

1.05 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such

deviations are specifically brought to the attention of Architect and approved in writing.

B. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties.
b. For masonry units, include data and calculations establishing average net-area compressive strength of units.

2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.06 QUALITY ASSURANCE

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
2. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
3. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
4. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

1.08 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the

standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.02 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units for outside corners unless otherwise indicated.

B. CMUs: ASTM C 90.

1. Density Classification: Lightweight unless otherwise indicated.
2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

C. Decorative CMUs: ASTM C 90.

1. Density Classification: Lightweight.
2. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
3. Pattern:

a. Screen Block: As indicated on the drawings.

D. General: Provide one of the following:

E. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.03 STEEL LINTELS

A. Steel Lintels: Comply with requirements of

2.04 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

E. Aggregate for Mortar: ASTM C 144.

F. Aggregate for Grout: ASTM C 404.

G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.

H. Water: Potable.

2.05 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: 0.187-inch diameter.
4. Wire Size for Cross Rods: 0.187-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

D. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch-diameter, hot-dip galvanized, carbon-steel continuous wire.

2.06 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
3. Stainless-Steel Sheet: ASTM A 666, Type 304.
4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, stainless-steel wire.

C. Partition Top anchors: 0.105-inch-thick metal plate with 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

D. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated bent to configuration indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.07 MISCELLANEOUS ANCHORS

A. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

B. Postinstalled Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
2. Material: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.08 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

2.09 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Mix to match Architect's sample.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:

    a. CMU's and Decorative CMUs.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Architect's sample.
2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:

    a. CMU's and Decorative CMUs.

F. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.

3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

3.03 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.04 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

G. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07920 "Fire-Resistive Joint Systems."

3.05 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.06 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.07 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.08 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.09 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 24 inches are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

2. Limit height of vertical grout pours to not more than 60 inches.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry *waste*, and legally dispose of off Owner's property.

END OF SECTION 04220

SECTION 05120 – STRUCTURAL STEEL

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 WORK DESCRIPTION

A. Furnish all labor, tools and equipment required for all metal fabrication related work for a complete and proper installation as indicated on the contract drawings and specified herein including.

B. Fabrication and installation of all structural steel framing members, including but not limited to beams, columns, rafters, plates, etc; and their related connections and fasteners.

1.03 RELATED WORK

A. The work specified herein shall be coordinated with all other required work and their respective trades. The following Sections cover work specifically related to this Section:

B. Interior Painting

C. Exterior Painting

C. Hot Dip Galvanizing

1.04 REFERENCES

A. ASTM A6 - General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.

B. ASTM A36/A992 - Structural Steel.

C. ASTM A307/A1554 - Carbon Steel Externally Threaded Standard Fasteners.

D. ASTM A325/A490- High Strength Bolts for Structural Steel Joints.

E. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

F. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

G. AWS A2.0 - Standard Welding Symbols.

H. AWS D1.1 - Structural Welding Code.

I. AISC – “Specification for the Design, Fabrication and Erection of Structural Steel for Buildings” (American Institute of Steel Construction.)

J. AISC - Code of standard practice for steel buildings and bridges.

K. AISC - Specification for Structural Joints using ASTM A325 or A490 Bolts approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation and endorsed by AISC.

L. “Code for Welding in Building Construction” of the American Welding Society.

M. “Manual of Steel Construction - Ninth Edition” of the American Institute of Steel Construction, Inc.

N. Americans with Disabilities Act Accessibility Guidelines.

1.05 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings prepared under supervision of a registered professional engineer, including complete details and schedules for fabrication and assembly of structural steel and all other materials specified in this Section.

2. Verify by taking on-site measurements, dimensions for existing conditions and for items requiring coordination with other trades before fabrication. Show dimensions on the Shop Drawings and note that they have been verified.

3. Indicate profiles, sizes, spacing, and locations of structural members, openings, connections, attachments and fasteners.

4. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.

5. Show surface preparation and painting requirements.

B. Welder's Certificates: Submit qualification record of procedures, tackers, welders, and welding operators to the Engineer. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within the previous 12 months. If recertification of welders is required, retesting will be Contractor's responsibility.

C. Product Data: Submit producer's or manufacturer's specifications and installation instructions for all products specified. Include data to show compliance with specifications (including specified standards).

D. Certificates of Compliance: Submit certificates attesting to conformance for the following.
1. Steel

2. Bolts, nuts, and washers

3. Shop painting materials

4. Welding electrodes and rods

5. Galvanizing

1.06 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, Latest Edition.

B. Qualifications of Welders: Use only AWS certified welders and the shielded arc process for all welding performed in connection with the work of this section.

1.07 QUALIFICATIONS

A. Fabricator: Company specializing in performing the work of this Section with minimum 5 years documented experience.

B. Erector: Company specializing in performing the work of this Section with minimum 10 years documented experience.

1.08 FIELD MEASUREMENTS

Verify that field measurements are as shown on Drawings.

1.09 DELIVERY, STORAGE, AND HANDLING:

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

B. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural Steel Plates, Bars, Angles, Channels: ASTM A36.

B. Steel Wide Flange Shapes: ASTM A992

C. Steel Pipe: ASTM A53, Type E or S, Grade B or ASTM, A501.

D. Steel HSS Shapes: ASTM A500, Grade B.

E. Anchors and Fasteners: Where exposed, shall be of the same material, color, and finish as the metal to which applied.

1. Bolts: ASTM A 325/A490, hot-dip galvanized

2. Nuts: ASTM A 563, Grade A, hex style, hot-dip galvanized

3. Washers: ASTM F 844, hot-dip galvanized.

4. Threaded Rods: ASTM F1554, Grade 36, hot-dip galvanized

5. Unfinished (Machine) Threaded Fasteners: ASTM A307, regular low-carbon steel bolts and nuts with hexagonal heads.

6. Stainless Steel Bolts: ASTM F 593, Type 316 alloy

7. Stainless Steel Nuts: ASTM F 594, Type 316 alloy

8. Stainless Steel Threaded Anchor Rods: Hilti HAS Rods 316SS

F. Welding Materials: AWS D1.1; Welding electrodes shall be low hydrogen type electrodes compatible with the type of steel welded. An E70 electrode shall be used for all Carbon Steel to Carbon Steel welds. Weld materials shall match or exceed the base metal in strength.

2.02 FABRICATION

A. Fabricate items of structural steel in accordance with AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings and also in accordance with the final shop drawings.

B. Connections of new steel to existing steel shall typically be welded. Connection of new steel to new steel will be either bolted or welded, as indicated.

1. Provide high-strength threaded fasteners for bolted connections, except where unfinished (machine) bolts are indicated.

C. All existing bolts shown to be removed and replaced shall be replaced with new ASTM A325 bolts, unless noted otherwise.

D. All bolted joints shall be in accordance with AISC Specification for Structural Joints using ASTM A325 or A490 bolts. All bolted connections shall have a minimum of two bolts.

E. All welded construction shall comply with the building and tubular provisions of AWS D1.1 Code.

1. Assemble and weld built-up sections by methods which will prevent warping.

2. Use welding procedures and sequences that prevent locked-in stresses or distortions.

F. All connections will be subject to the Engineer's review.

2.03 FINISH

A. Clean, prepare, shop prime and finish coat structural component surfaces in accordance with SECTION 09911-EXTERIOR PAINTING & SECTION 09912- INTERIOR PAINTING.

B. Do not prime surfaces that will be field welded.

C. Galvanizing ASTM A 123, ASTM A 153 and ASTM A 653, as applicable. Hot-dip galvanized steel frames, anchor bolts, fasteners, washers, and parts or devices necessary for proper installation unless indicated otherwise after fabrication where practicable.

D. Repair of Damaged Zinc-Coated surfaces: ASTM A 780, Annexes A1, “Repair Using Zinc-Based Alloys,” A2, “Repair Using Zinc-Rich paints”, or A3, “Repair using Sprayed Zinc (Metallizing)”.

E. Field Painting: Painting of metal surfaces shall be as specified in Section 09901 - PAINTING.

2.04 SOURCE QUALITY CONTROL AND TESTS

A. Testing of components will be performed under provisions of Section 1A.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field connections are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.02 ERECTION

A. Erect structural steel in accordance with AISC Specification, Bolting Specification and Code of Standard Practice as herein specified.

B. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Field weld components indicated on Drawings.

D. Do not field cut or alter structural members without approval of the Engineer.

E. Provide temporary planking, scaffolding, and working platforms as necessary to effectively complete work.

F. Do not enlarge unfair holes in members by burning or by use of drift pins. Ream holes that must be enlarged to admit bolts.

G. Immediately after erection, prime welds, abrasions and surfaces not shop primed, except surfaces to be in contact with concrete.

3.03 FIELD QUALITY CONTROL

Field inspection will be performed under the provisions of Division 1.

END OF SECTION

SECTION 05400 - COLD FORMED STEEL FRAMING

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes the following: furnish and install all cold-formed structural framing studs, tracks, joists, bracing, angles, plates, and related accessories indicated in the construction documents.

B. Related Sections:

1. SECTION 09911 – EXTERIOR PAINTING
2. SECTION 09912 – INTERIOR PAINTING

1.02 REFERENCES

A. American Iron and Steel Institute (AISI)

1. AISI, Specification For The Design of Cold-Formed Structural Members, latest edition.

B. American Society for Testing and Materials (ASTM):

1. ASTM Standard C955 - Standard Specification for Load Bearing (Traverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases.
2. ASTM Standard C1007 - Standard Specification for Installation of Load Bearing (Traverse and Axial) Steel Studs and Related Accessories.

1.03 SUBMITTALS

A. General: Submit the following in accordance with General Terms and Conditions – Shop Drawings and Other Submittals, and Submittal Procedures Section.

B. Approval Submittals:

1. The framing contractor shall be responsible for submitting part or all of the following items, as required by the construction documents:
   a. Manufacturers technical literature covering products.
   b. Manufacturers certification of product compliance with codes and standards.

C. Quality Assurance Submittals:

1. Mill Certificates

1.04 QUALITY ASSURANCE

Comply with provisions of Quality Assurance and Control Section and the requirements of this Section.

1.05 DELIVERY STORAGE & HANDLING

A. Comply with Product Requirements Section

B. Upon delivery, the structural framing materials shall be protected from the elements by storing them in a sheltered area or using protective covers.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

The cold-formed structural framing products shall be manufactured by the current members of the Steel Stud Manufacturers Association (SSMA). Manufacturers submitting published data showing their product values to be equal to those published by SSMA or the specialty product properties produced by the specific manufacturer.

2.02 STRUCTURAL PROPERTIES

Structural framing stud, joist and track properties shall be as published by SSMA or the specialty product catalog of the specific manufacturer. Equivalency shall be determined by published dimensional and structural properties including, but not limited to, member depth, flange size, lip size, design steel thickness, Area, effective Ix, and effective Sx.

2.03 MATERIALS

A. The cold-formed structural framing shall be manufactured from structural quality steel having minimum yield strength of 33 KSI, for all design thicknesses, or optional 50 KSI for 16GA (-54) and heavier members and have minimum protective coating equal to G-60 galvanized finish. The steel shall conform to one of the following ASTM Standards: ASTM A653, A875, A792 or A463.

B. Structural framing members shall conform to ASTM C955, have engineering properties calculated in conformance with the AISI “Specification For The Design Of Cold-Formed Steel Structural Members” and have minimum properties as published by SSMA.

C. All structural framing accessories shall be formed from structural quality steel with minimum yield strength of 33 KSI or as specified in the plan and have minimum protective coating equal to G-60 galvanized finish.

2.04 FASTENING

A. Structural framing members shall be properly spaced, plumbed, leveled, squared, fit properly against abutting members and held securely in place until permanently fastened. Wire tying of structural framing members is not permitted.

B. Fastening of structural framing members shall be accomplished by screws, power actuated fasteners, welding, or a combination of methods. The type, size, and spacing of the fasteners shall be as required by the contract documents or approved connection details.

C. Structural framing members may be fastened in a shop or in the field.

D. Structural framing members having protective coating removed by welding shall have the coating repaired, at the welds, by painting with a zinc rich primer.

PART 3 – EXECUTION

3.01 INSPECTION

Inspect supporting substrates and structure for compliance of conditions for installation and performance of the cold-formed structural framing system.

3.02 PREPARATION

Prepare attachment surfaces so that they are plumb, level, and in proper alignment for accepting the cold-formed structural framing system.

3.03 WALL FRAMING

A. Cold-formed structural framing members may be shop or field fabricated into wall assemblies, prior to erection, or stick built in the field.

B. The wall framing members shall be sized, spaced and erected in accordance with the contract documents or approved shop drawings.

C. The framing members shall have ends squarely cut by shearing or sawing, be installed plumb, square, true to line and securely fastened per the contract documents or approved connection details.

D. Fabrication, handling, and erection of wall framing members and assemblies shall be done in a manner to prevent any damage or distortion of the framing.

E. Cold-formed tracks, when set to adjacent structures, shall have web contact with a uniform and level bearing surface and be securely anchored with fasteners, sized and spaced per the contract documents or approved connection details.

F. Bracing of wall framing resisting wind (Traverse) loading only, (Non-axial loaded), can be accomplished by the attachment of wall sheathing to both sides of the studs. However, during construction, when only the exterior of the studs is sheathed, a minimum 2” wide steel strap, run horizontally on the interior flanges, attached to each stud and spaced at a maximum of 6’-0” throughout the height of the wall is recommended to brace the wall during construction.

G. Bracing of axial loaded wall framing shall be accomplished by either cold rolled channel, run horizontally through the stud punchouts and attached at each stud, or by minimum 2” wide steel straps run horizontally, on both sides of the studs, and attached at each stud. Vertical spacing of the bracing is limited to a maximum of 4’ - 0” throughout the height of the wall.

H. Structural “C” members are not permitted to have splices or cutouts in the flanges.

I. Framing of wall openings shall include jack studs, headers, cripples, sill plates and jamb studs as per the contract documents or approved shop drawings.

J. For wall framing assemblies that will form voids which will not be accessible to the insulation contractor the framing contractor shall be responsible for filling these voids, with suitable insulation, prior to assembly.

K. Slip connections, allowing for vertical movement of the structure without imposing vertical load on the wall framing, shall be per the contract documents or approved shop drawings.

L. Temporary bracing of wall framing shall be provided as required and removed only after the framing has been secured with permanent support.

M. Structural framing shear walls shall be built per the contract documents or approved shop drawings.

3.04 JOIST INSTALLATION

A. Structural framing joists shall be located, spaced, and installed per the contract documents or approved shop drawings.

B. Structural framing joists shall be supported by foundation walls, joist hangers, load distribution members, or lined up over vertical supports per the contract documents or approved shop drawings.

C. Structural framing joists shall have minimum 1-1/2 inches bearing support and a minimum 10 inches of unpunched web from any bearing support.

D. Joist web stiffeners shall be located and installed per the contract documents or approved shop drawings.

E. Bracing of the joist system shall be per the contract documents or approved shop drawings.

F. Provide additional support under bearing walls that run parallel to the joists and the wall length exceeds one-half the length of the joist span.

G. Provide additional support around openings, which exceed the normal spacing of the joists.

H. Provide end blocking where joist ends are not restrained against rotation.

END OF SECTION

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Steel framing and supports for overhead doors.
2. Steel framing and supports for countertops.
3. Steel framing and supports for mechanical and electrical equipment.
4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
5. Shelf angles.
6. Structural-steel door frames.
7. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

1.02 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.03 ACTION SUBMITTALS

A. Product Data: For the following:

1. Paint products.
2. Grout.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for overhead doors.
2. Steel framing and supports for countertops.
3. Steel framing and supports for mechanical and electrical equipment.

4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
5. Shelf angles.
6. Structural-steel door frames.
7. Loose steel lintels.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.05 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.06 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.

D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

F. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches.
2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; 0.079-inch nominal thickness.

H. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

I. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

2.03 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners.

B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

E. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

F. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

G. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.04 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Sections 09911 "Exterior Paints" and 09912 "Interior Paints."

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.05 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.06 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Galvanize and prime miscellaneous framing and supports.

2.07 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize and prime shelf angles.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.08 STRUCTURAL-STEEL DOOR FRAMES

A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

B. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.

C. Galvanize and prime steel frames.

2.09 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize and prime plates.

2.10 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches unless otherwise indicated.

C. Galvanize and prime loose steel lintels.

2.11 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.12 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.13 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with primers specified in Sections 09911 "Exterior Paints" and 09912 "Interior Paints."

D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.02 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.03 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.04 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 05500

SECTION 05520 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Steel railings.

1.02 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.03 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

C. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

D. Evaluation Reports: For post-installed anchors , from ICC-ES.

1.05 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.07 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.03 STEEL

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.04 FASTENERS

A. Hot-Dip Galvanized Railings: Type 304 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.05 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide primers that comply with Section 09911 "Exterior Paints" and Section 09912 "Interior Paints."

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.06 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

J. Form Changes in Direction as Follows:

1. By bending.

K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

P. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.07 STEEL FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize steel railings, including hardware, after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

E. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime railings with primers specified in Section 09911 "Exterior Paints" and Section 09912 "Interior Paints."

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.02 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.03 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.04 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

3.05 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.

C. Attach railings to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

D. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.06 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09911 "Exterior Paints" and Section 09912 "Interior Paints."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.07 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05520

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Formed roof-drainage sheet metal fabrications.
2. Formed low-slope roof sheet metal fabrications.
3. Formed wall sheet metal fabrications.

1.02 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Sample Warranty: For special warranty.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.07 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.09 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
   1. Design Pressure: As indicated on Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   1. Exposed Coil-Coated Finish:
      a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   2. Color: As selected by Architect from manufacturer’s full range.
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
   4. Application: Install aluminum sheet metal, flashing, and trim at aluminum window and door framing.

C. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
   1. Surface: Smooth, flat.
   2. Exposed Coil-Coated Finish:
      a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   3. Color: As selected by Architect from manufacturer’s full range.
   4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
   5. Application: Install metallic-coated steel sheet metal, flashing, and trim at locations where aluminum sheet metal is not installed.

2.03 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      a. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Ultra.
      b. Henry Company; Blueskin PE200 HT.
      c. Metal-Fab Manufacturing, LLC; MetShield.

d. Owens Corning; WeatherLock Specialty Tile & Metal Underlayment.

C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.04 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
   3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

2.05 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
   1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

H. Do not use graphite pencils to mark metal surfaces.

2.06 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch-long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
1. Gutter Profile: As indicated on Drawings and according to cited sheet metal standard.
2. Expansion Joints: Lap type.
3. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.
4. Gutters with Girth up to 15 Inches: Fabricate from the following materials:
    a. Galvanized Steel: 0.022 inch thick.
5. Gutters with Girth 16 to 20 Inches: Fabricate from the following materials:
    a. Galvanized Steel: 0.028 inch thick.

6. Gutters with Girth 21 to 25 Inches: Fabricate from the following materials:

   a. Galvanized Steel: 0.034 inch thick.
7. Gutters with Girth 26 to 30 Inches: Fabricate from the following materials:

   a. Galvanized Steel: 0.040 inch thick.
8. Gutters with Girth 31 to 35 Inches: Fabricate from the following materials:

   a. Galvanized Steel: 0.052 inch thick.

B. Downspouts: PVC, Schedule 80 pipe, ASTM D 1785, with schedule 80 socket fittings, ASTM D 2467.
1. Fabricated Hanger Style: As indicated on the Drawings and according to SMACNA's "Architectural Sheet Metal Manual."
2. Hanger Style: As indicated on the Drawings.
3. Fabricate from the following materials:

   a. Galvanized Steel: 0.034 inch thick.

2.07 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates. Shop fabricate interior and exterior corners.
1. Joint Style: Overlapped, 4 inches wide.
2. Fabricate from the Following Materials:

   a. Galvanized Steel: 0.028 inch thick.

B. Roof and Roof-to-Wall Expansion-Joint Cover: Fabricate from the following materials: Shop fabricate interior and exterior corners.

   1. Galvanized Steel: 0.034 inch thick.

C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

   1. Galvanized Steel: 0.028 inch thick.

D. Roof-Penetration Flashing: Fabricate from the following materials:

   1. Galvanized Steel: 0.028 inch thick.

2.08 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:

   1. Aluminum: 0.032 inch thick.
   2. Galvanized Steel: 0.022 inch thick.

B. Wall Expansion-Joint Cover: Fabricate from the following materials:

   1. Galvanized Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

B. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.03 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.
   6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

   1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
   1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.
   1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
   2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.04 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
   1. Fasten gutter spacers to front and back of gutter.
   2. Anchor and loosely lock back edge of gutter to continuous cleat.
   3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
   4. Anchor gutter with gutter brackets or straps spaced not more than 24 inches apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
   5. Anchor gutter with spikes and ferrules spaced not more than 24 inches apart.
   6. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
   7. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints.
   1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.

D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

3.05 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.06 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.07 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.08 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 08100 - METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes hollow-metal work.

1.02 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Preinstallation Conference: Conduct conference at Project site.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
2. For "Doors" and "Frames" subparagraphs below, prepare Samples approximately 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:

a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.05 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld International, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Custom Metal Products.
5. Pioneer Industries, Inc.
6. Republic Doors and Frames.
7. Steelcraft; an Ingersoll-Rand company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.02 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection

ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.03 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum G40 or A40 coating.
d. Edge Construction: Model 2, Seamless.
e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of of 0.042 inch, with minimum G40 or A40 coating.
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.04 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2..

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60 or A60 coating.
d. Edge Construction: Model 2, Seamless.
e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60 or A60 coating.
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.05 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.06 DOOR WEATHER-STRIP, GENERAL

A. Standard: BHMA A156.22.

B. General: Provide continuous weather-strip gasketing on exterior doors. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

D. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

2.07 DOOR WEATHER-STRIP

A. Adjustable, Housed, Perimeter Gasketing: Screw-adjustable gasket material held in place by metal housing; fastened to frame stop with screws.

1. Gasket Material: Silicone bulb, polyurethane bulb, vinyl bulb, or thermoplastic elastomer.
2. Housing Material: Aluminum or stainless steel.

B. Adjustable Astragals for Meeting Stiles: Screw-adjustable gasket material held in place by metal housing; mounted with screws.

1. Gasket Material: Silicone, neoprene, vinyl, or thermoplastic elastomer.
2. Housing Material: Aluminum.
3. Mounting: Surface mounted on face of each door.

C. Door Shoes: Gasket material held in place by metal housing; mounted to bottom edge of door with screws.

1. Gasket Material: Vinyl, thermoplastic elastomer, or neoprene.
2. Housing Material: Aluminum.
3. Extended Housing: Both sides of door.
4. Mounting: Surface mounted on bottom edge of door.

2.08 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 08800 "Glazing."

H. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.09 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more

than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Fire Door Cores: As required to provide fire-protection ratings indicated.
3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
4. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
5. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

    c. Compression Type: Not less than two anchors in each frame.

d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

8. Terminated Stops: Terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.10 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.11 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Section 08800 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08100

SECTION 08330 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Service doors.

1.02 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
5. Show locations of controls, locking devices, and other accessories.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Curtain slats.
2. Bottom bar.
3. Guides.
4. Brackets.
5. Hood.
6. Include similar Samples of accessories involving color selection.

1.03 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

PART 2 - PRODUCTS

2.01 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling door manufacturer.

B. Accessibility Requirements:

1. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.
2. The force required to activate operable parts shall not exceed 5 pounds maximum force.

2.02 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.

1. Design Wind Load: As indicated on Drawings.
2. Testing: According to ASTM E 330.
3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
4. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

2.03 DOOR ASSEMBLY

A. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.04 COMPONENT IMPORTANCE FACTOR: 1.0

A. Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Cornell Iron Works, Inc.
    b. Lawrence Roll-Up Doors, Inc.
    c. Overhead Door Corporation.
    d. Raynor.
    e. Wayne-Dalton Corp.

B. Operation Cycles: Door components and operators capable of operating for not less than 10,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. at 15 and 25 mph when tested according to ASTM E 283.

D. Door Curtain Material: Aluminum.

E. Door Curtain Slats: Curved profile slats of 1-7/8-inch center-to-center height.

F. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from aluminum extrusions and finished to match door.

G. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats.

H. Hood: Match curtain material and finish.

    1. Shape: Round.
    2. Mounting: Face of wall.

I. Locking Devices: Equip door with slide bolt for padlock where indicated on the Drawings.

J. Electric Door Operator:

    1. Usage Classification: Light duty, up to 10 cycles per hour.
    2. Operator Location: Wall.
    3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded.
    4. Motor Exposure: Exterior, wet, and humid.
    5. Emergency Manual Operation: Crank type.
    6. Obstruction-Detection Device: Automatic photoelectric sensor.
    7. Control Station(s): Where shown on Drawings.

K. Emergency Manual Door Operator: Manufacturer's standard crank operator.

    1. Provide operator with manufacturer's standard removable operating arm.

L. Curtain Accessories: Equip door with weatherseals.

M. Door Finish:

    1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

2.05 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Aluminum Door Curtain Slats: ASTM B 209 sheet or ASTM B 221 extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch; and as required.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

2.06 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.07 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Aluminum: 0.040-inch-thick aluminum sheet complying with ASTM B 209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

2.08 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

2.09 CURTAIN ACCESSORIES

A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.

1. At door head, use 1/8-inch-thick, replaceable, continuous-sheet baffle secured to inside of hood or field- installed on the header.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene.

2.10 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.11 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Location(s): Operator location as indicated on the Drawings.

D. Motors: Reversible-type motor for motor exposure indicated.

1. Electrical Characteristics:

a. Phase: Single phase.
b. Volts: 115 V.
c. Hertz: 60.

2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.

3. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

1. Push-Button Only Unit: Full-guarded, surface-mounted, standard-duty, waterproof type, with general-purpose NEMA ICS 6, Type 4 enclosure.

a. Location: Where indicated on the Drawings.

2. Key Operated Push-Button Unit: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure, key operated.

a. Location: Where indicated on the Drawings.

H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 5 lbf.

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.12 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.13 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Power-Operated Doors: Install according to UL 325.

3.03 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.04 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

1. Adjust exterior doors and components to be weather-resistant.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.05 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-

door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08330

SECTION 08700 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 80 - Fire Doors and Windows.
4. NFPA 101 - Life Safety Code.
5. NFPA 105 - Installation of Smoke Door Assemblies.
6. State Building Codes, Local Amendments.

D. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C - Positive Pressure Fire Tests of Door Assemblies

1.02 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.

2. Electrical Coordination: Coordinate with related Division 26 Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.03 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

   1. Scheduling Responsibility: Preparation of door hardware and keying schedules.

D. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.

   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:

   1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:

      a. Handles, Pulls, Latches, Locks, and other Operating Devices to comply with requirements of ADAAG Sections 404.2.7: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
      b. Door Closers: Comply with requirements of ADAAG Section 404.2.9 the following maximum opening-force requirements indicated:

         1) Interior Hinged Doors: 5 lbf applied perpendicular to door.

2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

c. Thresholds, comply with requirements of ADAAG Section 404.2.5: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

3. NFPA 101: Comply with the following for means of egress doors:

a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
b. Thresholds: Not more than 1/2 inch high.

4. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.

a. Test Pressure: Positive pressure labeling.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.05 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.06 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.

3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Five years for exit hardware.
3. Twenty five years for manual surface door closers.

1.07 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Door widths up to 3'0": Provide 4-1/2" standard or heavy weight as specified.
b. Door widths from 3'1" to 4'0": Provide 5" standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

1) Out-swinging exterior doors.
2) Out-swinging access controlled doors.
3) Out-swinging lockable doors.

5. Acceptable Manufacturers:

a. Hager Companies (HA).
b. McKinney Products (MK).
c. Stanley Hardware (ST).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings.

1. Acceptable Manufacturers:

a. McKinney Products (MK).
b. Pemko Manufacturing (PE).
c. Stanley Hardware (ST).

2.03 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

   1. Acceptable Manufacturers:

      a. Door Controls International (DC).
      b. Rockwood Manufacturing (RO).
      c. Trimco (TC).

B. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified below or in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

   1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with square corners and beveled edges, secured with exposed screws unless otherwise indicated.
   2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
   3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
   4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

      a. Acceptable Manufacturers:

         1) Hiawatha, Inc. (HI).
         2) Rockwood Manufacturing (RO).
         3) Trimco (TC).

2.04 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

   1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.

4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Manufacturer’s Standard.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.

E. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.

1. Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level. Geographical exclusivity to be provided for all security cylinders.
   a. Classic Primus Level 3.

2. Acceptable Manufacturer:
   a. Schlage (SC) - Classic Primus Series.

F. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:

1. Master Key System: Cylinders are operated by a change key and a master key.
2. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
3. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.
4. Existing System: Master key or grand master key locks to Owner's existing system.
5. Keyed Alike: Key all cylinders to same change key.

G. Key Quantity: Provide the following minimum number of keys:

1. Top Master Key: One (1)
2. Change Keys per Cylinder: Two (2)
3. Master Keys (per Master Key Group): Two (2)
4. Grand Master Keys (per Grand Master Key Group): Two (2)
5. Construction Keys (where required): Ten (10)
6. Construction Control Keys (where required): Two (2)
7. Permanent Control Keys (where required): Two (2)

H. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with

permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

I. Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

J. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Acceptable Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

K. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into “Key Wizard” software.

2.05 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - ML2000 Series.
b. Sargent Manufacturing (SA) - 8200 Series.
c. Schlage (SC) - L9000 Series.

B. Lock Trim Design: As specified in Hardware Sets.

2.06 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.5, Grade 1, certified small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - DL4100 Series.
b. Sargent Manufacturing (SA) - 4870 Series.
c. Schlage (SC) - L460 Series.

2.07 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.08 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

    a. Fire Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions to be used only with exit devices for which they have been tested.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty trim with cold forged escutcheons, beveled edges, and four threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.

b. Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.

6. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.
7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.
c. Von Duprin (VD) - 35A/98 XP Series.

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - 700/900 Series.
b. Sargent Manufacturing (SA) - 980S Series.
c. Yale Locks and Hardware (YA) - M200 Series.

2.09 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 10 million cycles in a test witnessed and verified by UL.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated

frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

    a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
    b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
    c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
    d. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

    1. Acceptable Manufacturers:

        a. Corbin Russwin Hardware (RU) - DC8000 Series.
        b. Sargent Manufacturing (SA) - 351 Series.
        c. Norton Door Controls (NO) - 7500 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

    1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
    2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
    3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.

        a. Stainless Steel: 050-inch thick, with countersunk screw holes (CSK).

    4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.

5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.
6. Acceptable Manufacturers:

    a. Hiawatha, Inc. (HI).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:

    a. Hiawatha, Inc. (HI).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Acceptable Manufacturers:

    a. Rixson Door Controls (RF).
    b. Sargent Manufacturing (SA).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:

1. Pemko Manufacturing (PE).
2. Reese Enterprises, Inc. (RS).
3. Zero International (ZE).

2.13 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities." Comply with section 404.2.6 door hardware for mounting height guidelines.
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.04 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.05 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. Manufacturer’s Abbreviations:

1. MK – McKinney
2. PE – Pemko
3. RO – Rockwood
4. RF – Rixson
5. SA - Sargent

C. Hardware Schedule:

SET: 1
Doors: PC E
Description: Pair of Exterior doors - Play Court Area

2	Continuous hinge	MCK-12HD	CL	MK
1	Removable Mullion	L980A LC (alum mull Anodized US28)	US28	SA
1	Exit device (NL-OP)	8804 LC	US32D	SA
1	Exit device (EO)	8810	US32D	SA
1	Mortise Cylinder (interchangeable	20-771	626	SC

	core)			
1	Rim Cylinder (interchangeable core)	20-757	626	SC
2	Concealed Overhead Holder	1 series holder (1-X26)	630	RF
2	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Mullion Gasketing	5110BL		PE
1	Weather strip	Provided with Kerf hollow metal frame		
2	Door Bottom	2221APK		PE

SET: 1A
Doors: PC A, PC C , PC D, PC G, PC H
Description: Pair of Exterior doors - Play Court Area

2	Continuous hinge	MCK-12HD	CL	MK
1	Removable Mullion	L980A LC (alum mull Anodized US28)	US28	SA
1	Exit device (NL-OP)	8804 LC	US32D	SA
1	Exit device (EO)	8810	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Rim Cylinder (interchangeable core)	20-757	626	SC
2	Concealed Overhead Holder	1 series holder (1-X26)	630	RF
2	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Mullion Gasketing	5110BL		PE
1	Rain Drip Cap (for head of door frame)	346C		PE
1	Weather strip	Provided with Kerf hollow metal frame		
2	Door Bottom	2221APK		PE

SET: 2
Doors: PC F
Description: Pair of Exterior doors - Play Court Area

2	Continuous hinge	MCK-12HD	CL	MK
1	Removable Mullion	L980A LC (alum mull Anodized US28)	US28	SA
2	Exit device (EO)	8810	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
2	Concealed Overhead Holder	1 series holder (1-X26)	630	RF
2	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Mullion Gasketing	5110BL		PE
1	Weather strip	Provided with Kerf hollow metal frame		
2	Door Bottom	2221APK		PE

SET: 2A
Doors: PC B
Description: Pair of Exterior doors - Play Court Area

2	Continuous hinge	MCK-12HD	CL	MK
1	Removable Mullion	L980A LC (alum mull Anodized US28)	US28	SA
2	Exit device (EO)	8810	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
2	Concealed Overhead Holder	1 series holder (1-X26)	630	RF
2	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Mullion Gasketing	5110BL		PE
1	Rain Drip Cap (for head of door frame)	346C		PE
1	Weather strip	Provided with Kerf hollow metal frame		
2	Door Bottom	2221APK		PE

SET: 3				
Doors: PCCP A, CBCP A, CBCP B, CBJS A, PCST3 A, PCST5 A, PCSTI A				
Description: Exterior pair of doors - Concession area, Janitor/Storage room				
6	Hinge (hvy wt)	T4A3386 NRP	US32D	MK
1	Top flush bolt	2805 self latch type	US26D	RO
1	Flush Bolt	555	US26D	RO
1	Lockset (apartment)	8243 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
2	Door Closer (parallel with stop/hold open arm)	SRI 351 PSH	EN	SA
2	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Rain Drip Cap (for head of door frame)	346C		PE
1	Weather strip	Provided with Kerf hollow metal frame		
2	Door Bottom	2221APK		PE
1	Overlap astragal	By hollow metal door supplier		
1	Overlap Astragal Gasketing	S88D		PE

SET: 4				
Doors: CBEL A				
Description: Exterior pair of doors - Electrical				
6	Hinge (hvy wt)	T4A3386 NRP	US32D	MK
1	Top flush bolt	2805 self latch type	US26D	RO
1	Flush Bolt	555	US26D	RO
1	Lockset (storeroom with deadbolt)	8251 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
2	Door Closer (parallel with stop/hold open arm)	SRI 351 PSH	EN	SA
2	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Rain Drip Cap (for head of door frame)	346C		PE
1	Weather strip	Provided with Kerf hollow metal frame		
2	Door Bottom	2221APK		PE
1	Overlap astragal	By hollow metal door supplier		
1	Overlap Astragal Gasketing	S88D		PE

SET: 5
Doors: CBRR A, CBRR B, CSRR A, CSRR B, PCRR A, PCRR D
Description: Exterior door - Restroom

3	Hinge (hvy wt)	T4A3386 NRP	US32D	MK
1	Deadbolt (classroom)	4877 LC	US26D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Push plate	70E CFC/CTFF	US32D	RO
1	Pull plate	126x70C CTFF/CFC	US32D	RO
1	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Wall stop	401	US26D	RO
1	Threshold	171AK FHSL14		PE
1	Weather strip	Provided with Kerf hollow metal frame		
1	Door Sweep	345ANB		PE

Notes: Mount center of push plate at 45 inches above the floor, mount center of pull plate at 42 inches above the floor. Locate bottom of pull handle 2 inches from bottom of the pull plate. Located thumb turn 2 inches from top of pull plate.

SET: 6
Doors: CBFT A
Description: Exterior door - Family Toilet

3	Hinge (hvy wt)	T4A3386 NRP	US32D	MK
1	Lockset (Dormitory)	49 8225 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Door Closer (parallel with stop arm)	SRI 351 PS	EN	SA
1	Kick plate	K1050 8" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Weather strip	Provided with Kerf hollow metal frame		
1	Door Bottom	2221APK		PE

SET: 7
Doors: PCOF A, PCST6 C
Description: Exterior door - Office and Storage room

3	Hinge (hvy wt)	T4A3386 NRP	US32D	MK
1	Lockset (apartment)	8243 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Door Closer (parallel with stop arm)	SRI 351 PS	EN	SA
1	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Rain Drip Cap (for head of door frame)	346C		PE
1	Weather strip	Provided with Kerf hollow metal frame		
1	Door Bottom	2221APK		PE

SET: 8				
Doors: CSJN A, PCRR C				
Description: Exterior door - Janitor				
3	Hinge (std wt)	TA2314	US32D	MK
1	Lockset (storeroom with deadbolt)	8251 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Wall stop	401	US26D	RO
1	Threshold	171AK FHSL14		PE
1	Weather strip	Provided with Kerf hollow metal frame		
1	Door Sweep	345ANB		PE

SET: 9				
Doors: PCOF C, PCOF D				
Description: Pair of doors - office storage				
6	Hinge (std wt)	TA2314	US32D	MK
1	Top flush bolt	2805 self latch type	US26D	RO
1	Flush Bolt	555	US26D	RO
1	Dust proofstrike	570	US26D	RO
1	Lockset (entry)	8255 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
2	Surface Overhead Stop	10 series stop (10-X36)	630	RF
2	Silencer	608		RO

SET: 10				
Doors: PCST2 A, PCST4 A				
Description: Pair of doors - storage room				
6	Hinge (std wt)	TA2314	US32D	MK
1	Top flush bolt	2805 self latch type	US26D	RO
1	Flush Bolt	555	US26D	RO
1	Dust proofstrike	570	US26D	RO
1	Lockset (holdback)	8291 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Flush cup pull	94	US32D	RO
2	Surface overhead holder/stop	9 series holder	630	RF
2	Silencer	608		RO
Notes: Pull for active door leaf. Mount pull just below lockset.				

SET: 11				
Doors: CBJS B, , PCRR B				
Description: Plumbing chanse, Janitor/storage				
3	Hinge (std wt)	TA2314	US32D	MK
1	Lockset (entry)	8255 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Wall stop	401	US26D	RO
3	Silencer	608		RO

SET: 12				
Doors: PCEL A				
Description: Electrical room				
3	Hinge (std wt)	TA2314	US32D	MK
1	Lockset (service)	8206 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Flush cup pull	94	US32D	RO
1	Door Closer (parallel with stop arm)	SRI 351 PS	EN	SA
1	Kick plate	K1050 10" high 4BE CSK	US32D	RO
3	Silencer	608		RO
Notes: Mount pull just below lockset.				

SET: 13				
Doors: PCOF B				
Description: Office				
3	Hinge (std wt)	TA2314	US32D	MK
1	Lockset (holdback)	8291 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Flush cup pull	94	US32D	RO
1	Surface overhead holder/stop	9 series holder	630	RF
3	Silencer	608		RO
Notes: Mount pull just below lockset.				

SET: 14 Doors: PCRC A Description: Exterior door – Fire Sprinkler				
3	Hinge (hvy wt)	T4A3386 NRP	US32D	MK
1	Lockset (storeroom with deadbolt)	8251 LNL LC	US32D	SA
1	Mortise Cylinder (interchangeable core)	20-771	626	SC
1	Door Closer (parallel with stop/hold open arm)	SRI 351 PSH	EN	SA
1	Kick plate	K1050 10" high 4BE CSK	US32D	RO
1	Threshold	2005AT ES14L		PE
1	Rain Drip Cap (for head of door frame)	346C		PE
1	Weather strip	Provided with Kerf hollow metal frame		
1	Door Bottom	2221APK		PE

END OF SECTION 08700

SECTION 10170 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Solid-plastic toilet compartments.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of centerlines of toilet fixtures.

C. Samples for Initial Selection: For each type of toilet compartment material indicated.

1. Include Samples of hardware and accessories involving material and color selection.

D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-square Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.

E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.03 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of toilet compartment.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.05 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents and source.

1. Door Hinges: One hinge(s) with associated fasteners.

2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
3. Door Bumper: One bumper(s) with associated fasteners.
4. Door Pull: One door pull(s) with associated fasteners.
5. Fasteners: Ten fasteners of each size and type.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

1. Toilet Compartments: Comply with requirements of ADAAG 604.2 through 604.8.
2. Grab Bars: Comply with requirements of ADAAG 609.1.
3. Operable Parts: Comply with ADAAG Section 309.

a. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist, ADAAG 309.4.
b. The force required to activate operable parts shall not exceed 5 pounds maximum force, ADAAG 309.4.

2.02 SOLID-PLASTIC TOILET COMPARTMENTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Sanitary Partition Corporation.
2. Ampco, Inc.
3. Bradley Corporation; Mills Partitions.
4. General Partitions Mfg. Corp.
5. Global Steel Products Corp.
6. Hadrian Manufacturing Inc.
7. Knickerbocker Partition Corporation.
8. Marlite.
9. Metpar Corp.

B. Toilet-Enclosure Style: Wall mounted.

C. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.

1. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
2. Color and Pattern: As selected by Architect from manufacturer's full ran.

D. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.03 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.

1. Hinges: Manufacturer's minimum 0.062-inch-thick stainless-steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through-bolts.
2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless-steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless-steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless-steel bumper at out-swinging doors. Mount with through-bolts.
5. Door Pull: Manufacturer's heavy-duty cast-stainless-steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.

B. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel.

2.04 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M.

B. Aluminum Extrusions: ASTM B 221.

C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

D. Stainless-Steel Castings: ASTM A 743/A 743M.

2.05 FABRICATION

A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Wall Mounted Units: Provide manufacturer's standard corrosion-resistant attachments, plumbing mechanism, and anchors to suit wall conditions and to provide attachment to doors.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels: 1/2 inch.
b. Panels and Walls: 1/2 inch.

2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.

a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

B. Wall Mounted Units: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.03 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10170

SECTION 10800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Washroom accessories.

B. Owner-Furnished Contractor Installed Material:

1. Single, jumbo roll, surface mounted toilet paper dispenser, SST finish: (1) for each toilet stall.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Samples: Full size, for each accessory item to verify design, operation, and finish requirements.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.03 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.06 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.07 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Accessibly Requirements:

1. General: Comply with applicable requirements of ADAAG Sections 309, 604, and 609.
2. Grab Bars: Comply with requirements of ADAAG 609.1.
3. Operable Parts: Comply with ADAAG Section 309.

a. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist, ADAAG 309.4.
b. The force required to activate operable parts shall not exceed 5 pounds maximum force, ADAAG 309.4.

2.02 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

2.03 WASHROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
6. Tubular Specialties Manufacturing, Inc.

B. Toilet Tissue (Jumbo-Roll) Dispenser:

1. Owner furnished, Contractor Installed.

C. Grab Bar:

1. Mounting: Flanges with concealed fasteners.
2. Material: Stainless steel, 0.05 inch thick.

a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.

3. Outside Diameter: 1-1/2 inches.
4. Configuration and Length: As indicated on Drawings.

D. Individual, Curved, Vandal Resistant Hook:

1. Description: Curved hook, 0.188-inch nominal-thickness, held by 0.141-inch-thick, stainless-steel bracket punched with not less than two holes for fastening with security fastener. Provide friction washer assembly, adjustable with a nonremovable security screw that maintains pressure on hook and allows hook to pivot when load exceeds preset limit.
2. Material and Finish: Stainless steel, No. 4 finish (satin).

2.04 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.02 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10800

SECTION 11483 - INTERIOR SCOREBOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Interior, electronic, multi-sport multi-purpose basketball/volleyball/wrestling scoreboards.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications:

1. ASTM B221 - Aluminum Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

B. National Electrical Code.

C. Federal Communications Commission, Part 15 Rules & Regulations.

D. UL and C-UL Standard for Electric Signs

1.03 ACTION SUBMITTALS

A. Product Data: For scoreboards, controls, and accessories. Include descriptions of control functions.

B. Shop Drawings: Provide installation drawings, face layout, dimensions, construction, electrical wiring diagrams, and method of anchorage.

C. Samples: For each type of finish.

D. Copy of Warranty

1.04 INFORMATIONAL SUBMITTALS

A. Manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Source Limitation: Provide components including scoreboard, control center, control cable, and other accessories and installation hardware produced by a single manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing electronic scoreboards with 10 years minimum successful experience.

C. Scoreboards and electrical components:

1. UL certified.
2. Electrically grounded in accordance with National Electrical Code (NEC), Article 600.

1.06 COORDINATION

A. Coordinate work with applicable Sections of Division 26.

1.07 WARRANTY

A. Furnish manufacturer's total system material and labor warranty to cover failure as follows:

1. 5 years parts and factory labor guarantee for scoreboards and accessories from date of substantial completion.
2. 2 years part and factory labor guarantee for wireless controls and receivers from date of substantial completion.

1.08 MAINTENANCE

A. Continual Maintenance: Provide lifetime telephone support.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: Nevco, 301 East Harris Avenue, Greenville, Illinois 62246; 800-851-4040; www.Nevco.com.

B. Available Manufacturers: Subject to compliance with requirements, provide basis of design products or comparable products by one of the following manufacturers:

1. ScoreTronics
2. Sportable Scoreboards
3. Varsity Scoreboards

2.02 MATERIALS

A. Aluminum Face and Perimeter Frame: Fabricated from 0.050 inch minimum thickness, ASTM B221 aluminum sheet.

B. Finish: Acrylic polyurethane paint. Color as selected by Architect from manufacturer's standard range.

C. Electronics: Low voltage, solid state, 2-wire cable, multiplex system, quartz crystal controlled.

D. Communication Interface: Fiber optic.

E. LED (light emitting diode) Units: Seven-bar, segmented digits in protective aluminum cover, rated typical life 100,000 hours, and designed to provide excellent visibility.

F. Provide location specific universal power cord with plug for world-wide installation.

G. Control Cable: UL listed, 2-wire, type RG-58/U, coaxial cable, 1/4 inch diameter.

H. Junction boxes where required: Sheet metal box and cover, 4-1/2 x 2-1/8 x 2-1/8 inches min. complying with NEMA standards.

2.03 MULTIPURPOSE SCOREBOARDS

A. Basis of Design Product: Nevco Model 2750-NL

B. Type: Interior, multi-purpose basketball/volleyball/wrestling electronic scoreboard with two integral horns, changeable captions, LED displays for time, scores, period, number of player fouling with personal fouls, team fouls, bonus and double bonus indicators, and next possession arrows. Rear-lit (RL) caption plates and Electronic Team Names (ETN). Apply no caption directly to the face of scoreboard.

1. Size: 8 feet long x 6 feet high x 8 inches deep.
2. Approximate hanging weight: 130 pounds.
3. Captions: Include the following in 6-inch tall letters:

    a. Basic: "Home", "Guests", and "period".
    b. Basketball: "fouls" and "player".
    c. Volleyball: "won" and "game".
    d. Wrestling: "match" and "weight".

4. LED displays:

    a. Timing: Super Bright Red 13 inches high digits with lit colon.
    b. Team scores: Super Bright Amber 13 inches high digits.
    c. Period: Super Bright Amber 9 inches high digits.
    d. Player number with personal fouls, game, and weight: Super Bright Red 9 inches high digits.
    e. Team fouls, games won, and match: Super Bright Amber 9 inches high digits.
    f. Next possession: Super Bright Amber arrow for each team.
    g. Include bonus and double bonus in the form of a 4 inch Super Bright Red LED “B”.

5. Rear-lit Captions: Provide rear lighting system that will require no maintenance
6. Provide Advertising /Team logo area 3 each, 12” x 12” minimum.
7. Suspension mounting attachments will be included.
8. Power requirement: 158 Watts, MAX, 100-240 Volts AC w/Power Factor Correction.

2.04 ACCESSORIES/OPTIONS

A. Provide each scoreboard or accessory with control cable of length required.

1. Electrical junction boxes, conduits, provided under applicable Sections of Division 26.

B. Electronic Team Names: “GUEST” caption plates to be replaced with programmable Electronic Team Names with the following features:

1. Changeable Team Names (ETN)
2. Red or Amber ETN LED’s

C. Provide scoreboards with the following options

1. Rear-lit caption plates.
2. Team Name in place of “HOME”.
3. Shot Clocks / End of Period (EOP) system.
4. Stats Panels
5. Protective Nets/Screens.

D. Red or Amber Message Centers.

2.05 CONTROL CENTER

A. Basis of Design Product: Nevco Model MPCW

B. Type: Wireless, microprocessor based, operator's control center with receiver unit mounted at scoreboard and designed to operate different models of scoreboard by interchange of keyboard overlay. Console will operate scoreboards

1. Comply with Part 15 of FCC Rules regarding interference.
2. Console: High impact, break-resistant gray plastic 11 x 9-1/2 x 4-1/8 inches.
3. Features:

a. Control can be used to operate both wireless and wired scoreboards.
b. Power on-off switch.
c. Split and raised 40 key keyboards, internal beeper acknowledging each entry, and bookmark capabilities.
d. Keyboard overlays for scoreboard or accessory.
e. Remote hand-held main time switch with integral horn button.
f. Provide with LED displays, lithium cell battery backup to maintain scoreboard memory and time of day, self test mode, power on-off switch, alternate time control, and multiple scoreboard operation.
g. Timer features: Time of day display, multiple time out timers with warning, interval horn, upcount auto stop with horn, and 1/10th second display during last minute.
h. Dimmer control for scoreboard.

4. Receiver: Aluminum construction, 6-1/8 x 3 x 1-3/8 inches with 4 inches antenna and mounted at scoreboard.
5. Maximum range: 1,000 feet from control center to receiver.
6. Power adapters: Provide for each control center and receiver.

a. Input: 120 volts, amps, 50/60 Hz.
b. Output: 9 volts, 1.67 amps, 15 watts.

7. Provide battery supply for control operation if utility power not available.

2.06 CARRYING CASE

A. Basis of Design Product: Nevco Model CC-3.

B. Provide carrying case for control center and hand-held switch.

1. Construction: Double wall, high density black polyethylene with padded interior, mechanical latches, and hinges.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify exact scoreboard and control center quantities and junction box locations with Architect.

B. Coordinate requirements for electrical power, wall blocking, auxiliary framing and supports, suspension cables, and other components to be provided under other Specification Sections to ensure adequate provisions are made for complete, functional installation of scoreboards.

C. Coordinate scoreboard electrical requirements to ensure proper power source, conduit, wiring, and boxes are provided. Prior to installation, verify type and location of power supply.

D. Before installation, field test scoreboards and accessories for operating functions.

1. Ensure that scoreboards accurately perform operations.
2. Correct deficiencies.

3.02 INSTALLATION

A. Install scoreboards and accessories in accordance with manufacturer's instructions and approved installation drawings.

B. Rigidly mount scoreboards and accessories level and plumb with brackets and fasteners.

C. Clean exposed surfaces.

D. Protect scoreboards and finishes from other construction operations.

3.03 DEMONSTRATION

A. Provide demonstration and training session for Owner's representative covering operation and maintenance of electronic scoreboard.

END OF SECTION

SECTION 11484 - EXTERIOR SCOREBOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Exterior, electronic, scoreboards including control center, and other accessories for complete functional installation for the following types of scoreboards:

1. Multi-sport scoreboards

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications:

1. ASTM B221 - Aluminum Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

B. National Electrical Code.

C. Federal Communications Commission, Part 15 Rules & Regulations.

D. UL and C-UL Standard for Electric Signs

1.03 ACTION SUBMITTALS

A. Product Data: For scoreboards, controls, and accessories. Include descriptions of control functions.

B. Shop Drawings: Provide installation drawings, face layout, dimensions, construction, electrical wiring diagrams, and method of anchorage.

C. Samples: For each type of finish.

D. Copy of Warranty

1.04 INFORMATIONAL SUBMITTALS

A. Manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Source Limitation: Provide components including scoreboard, control center, control cable, and other accessories and installation hardware produced by a single manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing electronic scoreboards with 10 years minimum successful experience.

C. Scoreboards and electrical components:

1. UL certified.
2. Electrically grounded in accordance with National Electrical Code (NEC), Article 600.

1.06 COORDINATION

A. Coordinate work with applicable Sections of Division 26 and Division 32.

1.07 WARRANTY

A. Furnish manufacturer's total system material and labor warranty to cover failure as follows:

1. 5 years parts and factory labor guarantee for scoreboards and accessories from date of substantial completion.
2. 2 years part and factory labor guarantee for wireless controls and receivers from date of substantial completion.

1.08 MAINTENANCE

A. Continual Maintenance: Provide lifetime telephone support.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: Nevco, 301 East Harris Avenue, Greenville, Illinois 62246; 800-851-4040; www.Nevco.com.

B. Available Manufacturers: Subject to compliance with requirements, provide basis of design products or comparable products by one of the following manufacturers:

1. ScoreTronics
2. Sportable Scoreboards
3. Varsity Scoreboards

2.02 MATERIALS

A. Aluminum Face and Perimeter Frame: Fabricated from 0.050 inch minimum thickness, ASTM B221 aluminum sheet.

B. Finish: Acrylic polyurethane paint. Color as selected by Architect from manufacturer's standard range.

1. Provide white striping to separate scoreboard features.

C. Brackets: S and J brackets fabricated from 5/16 inch minimum thickness steel plate for support and attachment of scoreboards to support framing.

D. Fasteners, anchors, and other exposed hardware: Corrosion resistant.

E. Electronics: Low voltage, solid state, 2-wire cable, multiplex system, quartz crystal controlled.

1. Electrical Contacts: Gold plated electrical contacts on interconnecting wiring.

F. Communication Interface: Fiber optic.

G. LED (light emitting diode) Units: Seven-bar, segmented digits in protective aluminum cover, rated typical life 100,000 hours, and designed to provide excellent visibility.

H. Control Cable: UL listed, 2-wire, type RG-58/U, coaxial cable, 1/4 inch diameter.

I. Junction boxes where required: Sheet metal box and cover, 4-1/2 x 2-1/8 x 2-1/8 inches min. complying with NEMA standards.

2.03 MULTI-SPORT SCOREBOARDS

A. Basis of Design Product: Nevco Model 3680.

B. Type: Exterior, electronic scoreboard with LED displays for number of player at bat, balls, strikes, outs, hit, error, scores by inning, and totals for runs, hits, and errors.

1. Size: 18 feet long x 8 feet high x 8 inches deep.
2. Approximate weight: 555 pounds.
3. Caption Plates: 2 each, 8 inches by 48 inches; 4 each, 8 inches by 32inches; and 2 each, 8 inches by 16 inches with 16 mm matrix red or amber LED displays:

a. Displaying per sport: "HOME", "GUESTS", “BALL ON” “DOWN” “YTG” “QTR” "SAVES", "SHOTS", "CK", "H/G", “PEN”, ""AT BAT”,”BALL”,”STRIKE”,”OUT."

4. High Intensity Red LED displays:

a. 24 inches high digits, except “tol”.
b. 14 inches high digits: Scores by inning and totals for runs, hits, and errors.

5. Power requirement: 120/240 volts, 5.48/2.74 amps, with All options included.

2.04 ACCESSORIES, GENERAL

A. Provide scoreboards with the following accessories:

1. Provide each scoreboard or accessory with control cable of length required to provide electrical power to scoreboards.

a. Electrical junction boxes, conduits, provided under applicable Sections of Division 26.

2. Electronic Team Names: “Home” and “GUEST” caption plates to be replaced with programmable Electronic Team Names with the following features:

a. Changeable Team Names (ETN)
b. Red or Amber ETN LED’s

3. Rear-lit caption plates.
4. Team Name in place of “HOME”.
5. Stats Panels

2.05 CONTROL CENTER

A. Basis of Design Product: Nevco Model MPC

B. Type: Wireless, microprocessor based operator's control center designed to operate different models of scoreboard by interchange of keyboard overlay. Console will operate scoreboards

1. Console: High impact, break-resistant black plastic with improved UV resistance. 11 inches by 9.5 inches by 4.125 inches.
2. Features:

    a. Provide with LED displays, lithium cell battery backup to maintain scoreboard memory and time of day, self test mode, power on-off switch, alternate time control, and multiple scoreboard operation.
    b. Split and raised 40 key soft touch keyboard.
    c. Spill resistant Keyboard.
    d. Internal beeper acknowledging each entry
    e. System Profiles feature set parameters of operation including choice of controlled accessories and scoreboards.
    f. Colorful graphic rich keyboard overlays for scoreboard or accessory.
    g. Remote hand-held main time switch with programmable integral horn button.
    h. 25-foot control cable with connectors.
    i. Timer features: Time of day display, multiple time out timers with warning, interval horn, up-count auto stop with horn, 0.1 second display during last minute, changeable horn tone on scoreboards with the feature.
    j. Segment timing for practice and workout.
    k. Dimmer control for scoreboard.
    l. Controller unit features accessible through yes/no abbreviated questions in a drop down menu format.
    m. Direct keyboard input management of multiple receiver.
    n. Control of electronic team names and automatic electronic caption plates from controller unit without need to change overlays.

3. Power requirements: 120 volts, 12 watts, 50/60 Hz.
4. Provide option of battery supply for control operation if utility power not available.
5. Provide carrying case for control center, cable, and hand-held switch; Model CC-3 as manufactured by Nevco Inc.

    a. Size: 18.5 inches by 14.5 inches by 6 inches.
    b. Construction: Double wall, high density black polyethylene with padded interior, mechanical latches, and hinges.

6. Receiver:

    a. Sturdy impact resistant construction, 6 inches by 4 inches by 1.5 inches
    b. Integrated antenna, mounted flush in scoreboard face.

        1) Use no protruding antennas.

7. Maximum Range: 1,000 feet from control center to receiver.
8. Receiver shall require no additional source of power or separate control cable.

2.06 CARRYING CASE

A. Basis of Design Product: Nevco Model CC-3.

B. Provide carrying case for control center and hand-held switch.

1. Construction: Double wall, high density black polyethylene with padded interior, mechanical latches, and hinges.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify exact scoreboard and control center quantities and junction box locations with Architect.

B. Coordinate requirements for electrical power, wall blocking, auxiliary framing and supports, suspension cables, and other components to be provided under other Specification Sections to ensure adequate provisions are made for complete, functional installation of scoreboards.

C. Coordinate scoreboard electrical requirements to ensure proper power source, conduit, wiring, and boxes are provided. Prior to installation, verify type and location of power supply.

D. Before installation, field test scoreboards and accessories for operating functions.

1. Ensure that scoreboards accurately perform operations.
2. Correct deficiencies.

3.02 INSTALLATION

A. Install scoreboards and accessories in accordance with manufacturer's instructions and approved installation drawings.

B. Rigidly mount scoreboards and accessories level and plumb with brackets and fasteners.

C. Clean exposed surfaces.

D. Protect scoreboards and finishes from other construction operations.

3.03 DEMONSTRATION

A. Provide demonstration and training session for Owner's representative covering operation and maintenance of electronic scoreboard.

END OF SECTION

SECTION 11680 - PLAYGROUND EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: As specified in Section 00700.

1.02 DESCRIPTION OF WORK

Furnish all materials, accessories, labor, tools and equipment required for the preparation and installation of playground equipment as indicated on the drawings and specified herein.

1.03 REFERENCES

A. U.S. Consumer Product Safety Commission Publication (CPSC) 3325, "Handbook for Public Playground Safety", November 2010 (or most current edition).

B. ASTM F1292 Standard Specification for Impact Attenuation of Surfacing Materials within the Use Zone of Playground Equipment

C. ASTM F1487 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use

1.04 SUBMITTALS

A. The following items shall be submitted as a complete set: piecemeal submittals shall not be acceptable and the time allotted for review of the submittal shall not commence until the complete set is received by the County. Claims for delay due to the contractor's failure to provide complete submittals shall not be entertained by the County and all costs, time lost, etc. shall be the contractor's sole concern and responsibility.

1. One (1) each original affidavit(s) signed by the manufacturer(s) and supplier(s) of the playground equipment proposed to be furnished under this Section certifying that such materials delivered to the project site conform to the requirements of these specifications.

2. Three (3) copies of the manufacturer's descriptive technical literature of all components it proposes to use in the playground equipment system provided for this project. The latest manufacturer's product data shall be submitted to ensure that the latest up-to-date models are used. All literature shall be originals, (copies will not be accepted) with all technical data (dimensions, gauges, thicknesses, material description, clear zone requirements, etc.); sakes brochures or marketing literature shall not be acceptable to satisfy this obligation.

3. A layout plan (scaled at 1/2' = 1'-0" minimum) of the complete playground equipment system proposed for the project consisting of the following information:

a. Dimensions of the overall effective playground surface area (less edge transitions and curbing) required for the project and overall dimensional layouts for the entire installation including edge transitions and perimeter edge treatments. Provide dimensions necessary for laying out the equipment for installation.

b. All components shall be clearly distinguishable and labeled with the manufacturer's model number for cross referencing of manufacturer's descriptive literature and verification of satisfaction of the minimum requirements of this section.

c. Clearly label all deck heights

d. Clearly label and demarcate all play components/elements that satisfy the 2010 ADA Standards for Accessible Design and the U.S. Consumer Product Safety Commission's requirements for playgrounds.

e. Demarcate and dimension all minimum fall safety zones (in accordance with the most stringent and up to date standards) for each play element that requires Such and minimum distances required between adjacent play elements or equipment, as applicable.

f. Dimension distances from ends of slide-type and climbing-type elements to edge of effective playground surfacing area when such is less than 8-feet.

4. Manufacturer's installation manual complete with instructions for each of the products being installed.

5. An example of the manufacturer's warranty document to be issued for this project that satisfies the terms of the warranty required of this section.

No ordering of materials shall be done until all of the submittal (s) specified above have been approved by the Director.

B. The Contractor shall furnish to the Director three (3) copies of a plan with the proposed playground equipment shown placed within the extents of the pad provided and indicating clear distances per "handbook for Public Playground Safety" of the U.S. Consumer Product Safety Commission are maintained.

C. The following submittals shall be submitted after installation is complete but prior to acceptance of the playground equipment system:

1. Provide written certification by a Certified Playground Safety Inspector registered with the National Playground and Safety Institute (NPSI) that the playground installation conforms to the CPSC's current edition of the Handbook for Public Playground Safety, the 2010 ADA Accessible Design Standards and the applicable ASTM standards. The written certification shall include the CPSI's certificate and professional contact information. Cost for this work shall not be paid for separately but shall be incidental to the project.

2. The Contractor shall furnish to the Director three (3) copies of the warranty information as described in Section 2.0, B specific for this project.

3. Furnish one original and two copies of the contractor's Guarantee.

1.05 STORAGE OF MATERIAL

A. All products shall be delivered to the job site, packed separately and properly

labeled. Contractor shall immediately review delivered products against the packing list and complete inventory listing of parts to determine that all requisite components are delivered to the project site in acceptable condition.

B. Deliver, handle, store and protect products to prevent damage and to maintain security.

1.06 QUALITY ASSURANCE

A. Installation foreman shall have not less than five (5) years prior experience of similar installations in the State of Hawaii dating back a minimum of one calendar year from the projected installation date for this project. The contractor shall submit a detailed resume of work for the installation foreman listing projects, locations, customer contact information to coordinate and review the component parts of the playground equipment system to prove compliance with this requirement.

B. The installation foreman shall be present at the job site personally overseeing all playground equipment preparatory, installation and cleanup work **at all times.**

C. The playground equipment installation contractor shall be certified by the playground equipment manufacturer for installation of its product. The contractor shall submit, prior to commencement of installation, a letter specifically prepared for this project (naming the contractor's company, the project name and number) attesting to their certification.

1.07 GUARANTEE

The playground equipment installation contractor shall provide a written guarantee, on Its company letterhead signed by one of its corporate officers that provides for the full replacement of any defective parts or components and of all stainless steel fasteners that exhibit signs of rust within one year of acceptance of the project.

1.08 WARRANTY

A. Manufacturer to warrant all equipment to be free of defects in manufacturing and material.

B. Manufacturer to provide a 100 year limited warranty for all stainless steel fasteners, aluminum posts, clamps, beams and caps, against structural failure due to corrosion/natural deterioration or manufacturing defects.

C. Manufacturer to provide a 15 year limited warranty for all plastic and steel components against structural failure due to corrosion/natural deterioration or manufacturing defects.

D. Manufacturer to provide a 5-10 year limited warranty for all structural steel frames against structural failure due to natural deterioration or manufacturing defects.

E. Manufacturer to provide 3 year limited warranty for all other parts against structural failure die to natural deterioration or manufacturing defects.

F. Manufacturer to provide a 15 year limited warranty for on all perforated steel decks; stainless steel slides aluminum slides and tubular steel parts.

1.09 SAFETY GUIDELINES AND STANDARDS:

A. All materials and equipment shall conform to the current issue of the "Handbook for Public Playground Safety" published by the consumer Product Safety commission (C.P.S.C.) and ASTM F1487. The contractor, manufacturer and playground Installation subcontractor shall be responsible for correcting all violations of the C.P.S.C. Guidelines and ASTM F1487, to the satisfaction of the Director, should they be found identified after installation. All labor, equipment and material costs associated with the correction of these violations shall be borne solely by the contractor.

B. The playground equipment shall satisfy the requirements of the current ADA Accessibility Guidelines (ADAAG) Section 15.6 Play Areas. Additional play equipment components /elements required beyond those listed in this section shall be provided by the Contractor incidental to this work such that the minimum accessibility requirements are satisfied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The playground equipment described in this section shall be an integrated system provided by a single playground equipment supplier for the expressed purpose of creating a unified playground experience that will be warranted by that single entity. Assembling equipment sourced from different suppliers to satisfy the minimum requirements for this project is expressly prohibited.

1. Manufacturer shall have a minimum of ten (10) years of documented experience in manufacturing playground equipment systems in the United States of America similar to that required of this project.

2. For reasons of convenience and to establish minimum standards of quality, character, design aesthetics, performance, functionality and experiential quality for this project. The products of the following manufacturer is incorporated into these specifications in addition to the general descriptions of the minimum required playground components:

GameTime®, a PLAYCORE company

3. The products of other manufacturers not listed herein shall be pre-qualified in accordance with paragraph 6.2 SUBSTITUTION OF MATERIALS AND EQUIPMENT of the County's General Requirements and Covenants as amended by the Special Provisions.

The burden of proof as to the comparative quality and suitability of any alternate brand or make shall be upon the bidder, and it shall furnish, at its own expense, all information relating thereto at the time of making such a request. The County shall be the sole judge as to the suitability of the alternate brand or make, and its decision shall be final. Additionally, the requestor shall identify the components it proposes to use in satisfaction of the specific play equipment components described in paragraph 2.02.E of this section. Approval of any substitution request does not inherently provide approval for derivations from any other requirement of this section or of the project.

At minimum, the following shall be provided in order for the County to determine acceptability of the products proposed for substitution:

a. A complete manufacturer's design guide/handbook, in color, that depicts the products it proposed for consideration on this project as individual components and as part of larger system in a real-world type application appropriately marked and labeled for ease of reference by the County.

b. A parts sheet and/or installation sheet that clearly depict the method of installation/attachment to the overall system and that identify the appurtenances and accessories required for installation.

2.02 PLAY EQUIPMENT

A. Playground equipment must be of modular design and include all elements listed in the specifications and shall fit within the Buildable Playground Area (hereinafter "BPA") as shown on the plans, inclusive of all requisite fall safety zones, edge transitions, perimeter curbing, additional required surfacing, graded areas, and other physical improvements.

B. The colors of all exposed components of the playground equipment (posts, decks, brackets, panels, roofs, shades, slides, rails, supports, play elements, etc.) shall be selected specifically by the Director prior to ordering. Color selections shall be made from all available manufacturers' colors for each component irrespective of price range differences except that custom-mixed color services available only upon special request shall not be incorporated into this project. There shall be no limitation as to the number of colors that may be incorporated throughout the playground equipment.

C. The play areas shall be configured such that the transfer platform is in close approximation to the entry walkway.

D. The following list of play equipment and components is intended to set forth the minimum character, aesthetic, function and experiential qualities desired for this project.

1. Play Area (5-12 year olds)

a. Main deck upright supports shall be 5" diameter embedded a minimum of 32" (or greater as required by manufacturer); shall not be less than 32" whatsoever.

b. Play element/component list:

i. (3) Perforated metal arched shaped roofs

GameTime®: 80104 Perf Metal Roof
Miracle®: 714-565 Mesh Roof w/ Arches
Little Tikes: 200127153 Arch Roof
Burke: 670-0164 Swaged Roof

ii. Rotationally molded double-bedway straight slide attached to a min. 48" deck.

GameTime®: 90508 Double Zip Slide

Miracle®: 714-565 Mesh Roof w/ Arches
Little Tikes: 200006976 Double Wide Plastic Slide
Burke: 470-0436 Triple Rail Slide

iii. Rotationally molded 30” diameter straight tube slide attached to a min. 36” deck.

GameTime®: 90286 Straight Tube Slide
Miracle®: 714-739-3 Straight Tube Slide
Little Tikes: 200006983 Tunnel Slide
Burke: 470-0389 Straight Tube Slide

iv. Rotationally molded straight wavy slide attached to a min. 36" deck.

GameTime®: 90503 Wave Zip Slide
Miracle®: 714-670 Chameleon II Slide
Little Tikes: 200201024 Wave Slide with Hood
Burke: 470-0514 Rock & Roll Slide

v. Two-Deck SpanTrain Themed Play Event; minimum 36” x 72”; to include train themed HDPE panel enclosures, Rotationally molded boiler, smoke stack,& cowcatcher, Rotationally molded 30”diameter 36” long crawl tube, and metal arch roof.

GameTime®: 81686 Train Locomotive
Miracle®: 714-646-2B (2) Train Front Wheel
714-646-3B Train Rear Wheel
714-646-1 Full Miralene Train Window
714-602-11 (2) Steel Window Panel
714-565-TRN Train Mesh Roof w/ Arches
Mesh Roof Extensions w/ Arches
714-757-34TRN Climbing Wall Train Cow Catcher
Little Tikes: (2) 200109865 Safety Rail Panels
(2) 200201475 Train Gear Panels
200007112 Bubble Panel
200201476 Smoke Stack
200201336 Train Cattle Guard
200127153 Arch Roof
Burke: 580-1014 LB Train Engine
018-0097 Tube
018-0543 Wheel Rail Panel
018-1415 Engine Stack
018-1521 Incline Panel
018-1522 Front Wheel Panel
018-1523 Single Wheel
018-1524 Engine Front Panel
018-1525 Engine Side Panel
018-1526 Train End Panel
018-1527 Front Wheel Rh Panel
018-1531 Train Panel
018-1533 Train Bench Panel
018-1535 Train Counter Top Panel
018 Tube Bell/Support

vi. Arched Bridge Link

GameTime®: 90393: Mini Arch Bridge
Miracle®: 714-970-49 Arch Bridge
Little Tikes: 200200392 Arch Bridge w/Guard Rails
Burke: 270-0190 Mini Arch Bridge

vii. (2) Train Themed HDPE Panels

GameTime®: 90465 Train Cabin
Miracle®: See v.
Little Tikes: (2) 200200785 Monkey Lean Out Rail
Burke: See v.

viii. Seat and table below deck

GameTime®: 81665: Seat and Table for Two
Miracle®: 714-715-7B Rest Stop
714-7158B Tot Table
Little Tikes: (2) 200109899 Seat Panels
200093380 Play Table
Burke: 470-0386 Double Leaf Seats w/ Mart Table

ix. Arched Metal Climber with rubber coated footholds

GameTime®: 90072 Fat Pipe Climber
Miracle®: 714-967 Curved Climber
Little Tikes: 200202781 Arch Log Climber
Burke: 370-0384 Fan Climber

x. Rotationally molded curved crawl tube connecting decks at a min. 36” over two-deck spans.

GameTime®: 90595 “S” Crawl Tube
Miracle®: 714-745-6 “S” Crawl Tube
Little Tikes: 200041634 “S” Crawl Tunnel
Burke: 570-0068 “S” Tunnel

xi. Rotationally molded wavy plastic climber attached to a min 36” deck.

GameTime®: 90545 Wave Climber
Miracle®: 714-787 Tot Rock Climber
Little Tikes: 200200180 Infinity Climber
Burke: 370-0745 Amped Climber 1

Xii Rotationally molded vertical climber

GameTime®: 90592 Ridge Climber
Miracle®: 714-608-3 Wavy Wedge Wall Walker
Little Tikes: 200202475 Tilted Rock Wall
Burke: 370-0306 Deck to Deck Plank

xiii. Transfer platform and step

GameTime®: 80688 transfer platform
Miracle®: 714-851-49 Square Transfer Point
Little Tikes: 200202561Transfer Station
Burke: 270-0129 Triangle Platform
370-0313 Single Step

xiv. 90 degree bridge connecting min. 36" high decks over min. 96" span.

GameTime®: 90583 Funnel Bridge
Miracle®: 714-856-L9 90 Degree Level Ramp
Little Tikes: 200200100 90 Curved Bridge
Burke: 270-0229 90 Degree Platform

xv. Minimum (2) rotationally molded play panels

GameTime®: rotationally molded play panels
Miracle®: 714-983-1 Marble Races Panel
714-756 Sight-N-Sound Panel
Little Tikes: (2) 200200506 Gear Reach Panels
Burke: 570-0796 Propeller Panel
570-1562 Gear Panel
570-1724 Rain Wheel Panel
570-0875 Tunnel Panel
570-0716 Clicker Activity Panel
570-0717 Raindrops Activity Panel

xvi. Whistle

GameTime®: 81695 Train Whistle
Miracle®: 714-796-P1 Post Mounted Bell
Little Tikes: 200202538 Deck with Bells (Added Play Value)
(2) 200058823 Talk Tubes
Burke: 670-0156 Post Mounted Bell

xvii. Spiraling metal climber with HDPE steps

GameTime®: 90668 Spiral Step climber
Miracle®: 714-867-25 Twisted Vine Climber 4' Deck
Little Tikes: 200200690 Infinity Wings Climber
Burke: 370-0179 Convex Climber

xviii. Freestanding Playhouse with arched uprights, HDPE walls panels, HDPE roof panels, HDPE countertops, HDPE chimney, metal seat, and min. 2 themed activity panels.

GameTime®: 36059 Nature Discover Playhouse
Miracle®: 714-713-7B Store Front Panel
714-966-3B (2) Fence Post
714-966-2B Sit-N-See
714-866-2 Triple Play Roof

Little Tikes: Village House
200054651 Village Window Panel
200054652 Village Door Frame
200054654 Village Seat Panel
200054659 Village Animal Panel
200054653 Village Counter Panel
200202457 Theater Panel
200060686 Quad Roof
Burke: 270-0130 Square Platform
270-0192 Clubhouse Unitary Enclosure
370-0420 Leaf Climber
470-0625 Clubhouse Retreat Roof
560-0526 Single Pod Walks
560-0553 Nature Play Stump
570-0557 Counter Panel
570-0782 Clubhouse full Board Panel
570-0783 Club House Upper Board

xix. (7) Freestanding rotationally molded trees configured in a maze

GameTime®: 39017 Large Conifer Maze
Miracle®: 704-620 (7) Big Timber Post Topper
Little Tikes: (7) 100005464 Palm Trees
Burke: 560-0454 FSI Branch Tree Climbers

xx. Freestanding straight post spinner

GameTime®: 36035 Centrix
Miracle®: 945-1 Saddle Seat w/ Angled Post
Little Tikes: 200007037 Log Roll
Burke: 560-0454 Daisy Spinner

xxi. Freestanding belt seat rocker

GameTime®: 36034 Toddle Rocker
Miracle®: 826 Balance Board w/ Posts
Little Tikes: 200201539 Stand-N-Spin
Burke: 560-0457 Swift Twist

c. Provide as many ground level activities as required either at low level of deck or free standing elements. A minimum of these activities shall be Compression-molded plastic panels. Two (2) color minimum each panel.

Miracle®: 900-P1 Steering Wheel
796-P1 Post Mounted Bell
714-994 Fun Fone

d. Barriers: Provide compression molded plastic barriers, no pipe style barriers allowed unless specifically called for on the plans.

e. Decks: Provide an array of connected, multi-level deck areas at the following specified minimum heights and areas to create an engaging and challenging experience for children utilizing the playground equipment with 5" diameter posts for the main deck-support uprights. All decks shall be completely covered with roofs.

i. Minimum of 36 square feet of PVC coated decks at 36" minimum height.

Miracle®: 31 square feet at 36”
Miracle®: 56 square feet at 48”

ii. Minimum of 12 square feet of PVC coated decks at 42" minimum height.

Miracle®: 16 square feet at 42”

f. Though not listed or described in detail, the contractor shall provide all appurtenant components and accessories necessary for a complete system based on these requirements, which shall include, but not necessarily be limited to, additional, decks, transitions, brackets, supports, panels, rails, fittings, fasteners, etc., which are the contractor's responsibility to provide for as a part of its complete play equipment package.

g. Substitutions: The Director shall have the sole right to determine the acceptability of any proposed substitution of play components or play systems based on factors such as durability, physical effort required, play experience, aesthetics, maintenance care requirements, etc. The Director's decision shall be final. The contractor shall solely bear the burden of proof that its products proposed for use on this project meets or exceeds the intent of the play equipment component list and ALL requirements of these specifications, to the satisfaction of the Director.

h. The play equipment layouts provided on the plan sheets that accompany these specifications is intended to illustrate to all prospective bidders that the play equipment requirements included herein can be satisfied within the buildable play area required of this project.

2.03 MATERIALS

A. Playground Equipment shall comply with the latest edition of the "Handbook for Public Playground Safety" of the U.S. Consumer Product Safety Commission, ASTM F 1487 and IPEMA certified.

1. For posts that are a plate/surface-mounting system: mounting brackets, plates flanges, and fittings must be manufactured of non-corrosive materials. Expansion bolts used for installation may be set in place and hand tightened as early as three (3) days after concrete pout but must NOT be fully-anchored until after 21 calendar days.

2. Footings: Unless otherwise specified, the bury on all footings shall be 34" below Finished Grade (FG) on all in-ground play events/posts.

3. Mounting panel brackets, connecting angles, fasteners, and collars must be constructed of non-corrosive metal and must be tamper-resistant. All connecting bolts and washers must be stainless steel per ASTM F 9879. All primary fasteners shall include a locking patch type material that will meet the minimum torque requirements of IFI-125. Manufacturer to provide special tools for pinned tamperproof fasteners.

4. All materials shall be structurally sound and suitable for safe play.

5. All materials and supplies furnished under this project shall be new and protected from corrosion. Anti-corrosive treatments shall meet the following requirements.

i. Polyvinyl Chloride (PVC) coating: All metal components to be PVC coated shall be thoroughly cleaned in a hot phosphatizing pressure washer, and then primed with a water-based thermosetting solution. Primed parts shall be preheated prior to dipping in U.V. stabilized, liquid polyvinyl chloride, and then salt cured at approximately 400 degrees. The finished coating shall be approximately .080" (+/- .020") thick at 85 durometer hardness and have a matte finish.

OR

Polyethylene (PE) coating: All metal components to be PE coated shall be thoroughly cleaned in a hot phosphatizing pressure washer. Primed parts shall be preheated prior to dipping in U.V. Stabilized, polyethylene copolymer-based thermoplastic powder until the coating reached its target thickness, and then salt cured at approximately 400 degrees. The finished coating shall be 45 to 55 mils on the wear surfaces and 30 mils on other surfaces.

ii. Polyester Powder coat finish: All metal components shall be thoroughly cleaned and phosphatized through a minimum five-stage bath system. Parts are then thoroughly dried, preheated and processed through a set of automatic powder spray guns where an epoxy primer is applied. The parts are allowed to cool and then pass through a second set of automatic powder spray guns. A minimum .002" of architectural-grade Super-Durable polyester TGIC powder is applied. The parts are oven-cured at 400 degrees F metal temperature for 10-minutes. The average film thickness is .006".

The finish must be formulated and tested per the following ASTM standards. Each color must meet or exceed the ratings listed below:

ASTM D3363 Hardness:.....	\rating 2H
ASTM C2794 Impact.....	80 inch-pounds min.
ASTM B117 & D 1654 Salt Fog Resistance:.	4,000 hrs; rating 7 or greater
ASTM G 154 UV Exposure:.....	(340 bulb) 3,000 hours, rating delta E of 2, and 90 percent gloss retention
ASTM D3359 Adhesion:.....	.(Method B) rating 5B

iii. Rotationally Molded Poly Parts: These parts shall be molded using prime compounded linear low-density polyethylene with a tensile strength of 2500 psi per ASTM D638 and with color and UV-Stabilizing additives.

iv. Permalene Parts: These parts shall be manufactured from 3/4: thick high-density polyethylene that has been specially formulated for optimum U.V. stability and color retention. Products shall meet or exceed density of .960 G/cc per ASTM D1595, tensile strength of 2400 PSI per ASTM D638. Products shall meet or exceed density of .960 G/cc per ASTM D1505, tensile strength of 2400 PSI per ASTM D638.

B. Composite System Materials

1. Decks: All decks shall be of modular design and have drain holes on the standing surface. Decks shall be manufactured from a single piece of low carbon 12 GA (.105") minimum sheet steel conforming to ASTM specification A-569. The sheet shall be perforated then flanged formed and reinforced as necessary to ensure structural integrity. The unit shall be PVC or PE coated.

2. Posts: Post length shall vary depending upon the intended use and shall be a minimum of 42" above the deck height. All posts shall be powdercoated to specified color. All posts shall have a "finished grade marker" positioned on the post identifying the 34" bury line required for correct installation and the top of the protective surfacing.

a. Steel Posts

i. All 5" OD steel posts shall be manufactured from tubing with a minimum wall thickness of .120" and shall be galvanized after rolling and shall have both its interior surfaces and the cut ends sprayed with a corrosion resistant coating.

5" OD Steel Post Mechanical Properties:

Yield Strength (min):	50,000 PSI
Tensile Strength (min):	50,000 PSI
Elongation in 2 inches:	25%
Modulus of Elasticity:	29.5 x 1,000,000 PSI

ii. All 3 1/2" OD posts shall be galvanized after rolling and shall have both the I.D. and the cut ends sprayed with a corrosion resistant coating.

3 1/2" OD, 8 ga.	48,000 PSI
Tensile Strength (min)	48,000 PSI
Yield Strength (min)	45,000 PSI

3 1/2" OD, 13 ga.	
Tensile Strength (min)	55,000 PSI
Yield Strength (min)	50,000 PSI

iii. All 3 1/2" OD cantilever steel posts shall be manufactured from tubing with a wall thickness of min 8 gauge and shall be galvanized after rolling and shall have both the I.D. and the cut ends sprayed with a corrosion resistant coating.

b. Steel Arch Posts

Shall be an all welded assembly fabricated of 3/5 in. outside diameter, 11 gauge galvanized steel tubing (arch), 4 in. outside diameter, 8 gauge galvanized steel tubing (sleeve), and 1006 cold rolled steel.

c. Aluminum Posts

i. All aluminum posts shall be manufactured from extruded tubing conforming to ASTM B-221 from 6005-T5 if not welded or 6061-T6 if welded. Posts shall have a 5" outside diameter with a /125" wall

thickness. Finished with a baked on polyester powder coating.

ii. Aluminum Post Mechanical Properties:

Yield Strength (min):	35,000 PSI
Tensile Strength (min):	38,000 PSI
Elongation in 2 inches:	10%
Modulus of Elasticity:	10 X 1,000,000 PSI

3. Post Caps:

i. Top caps for posts shall be aluminum die cast from high strength aluminum alloy and powdercoated to match the post color. All caps shall be factory installed and secured in place with self sealing drive rivets. A molded low-density polyethylene cap, with drain holes, may be pressed onto the bottom end of the post to increase the footing area.

Yield Strength (min):	21,000 PSI
Tensile Strength (min):	40,000 PSI

ii. A cap, with drain holes, must be pressed onto the bottom end of posts as exposed areas.

4. Steel Tubing:

i. 3.5" OD, 8ga.

Yield Strength (min):	45,000 PSI
Tensile Strength (min):	48,000 PSI

ii. 3.5: OD, 13 ga.

Yield Strength (min):	50,000 PSI
Tensile Strength (min):	55,000 PSI

5. Kick Plates

a. Fabricated from 11 GA (.120") HR flat steel. Fasteners: Primary fasteners shall be socketed ad pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated.

6. Clamps: All clamps, unless otherwise noted, shall be die cast using a 369.1 aluminum alloy and have the following mechanical properties:

Ultimate Tensile:	47,000 PSI
Yield Strength:	28,000 PSI
Elongation:	7% in 2 inches
Shear Strength:	29,000 PSI
Endurance Limit:	20,000 PSI

7. Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated. All primary fasteners shall include a locking patch-type material that will meet the minimum torque requirements of IFI-125. Manufacturer to provide special tools for pinned tamperproof fasteners.

8. Barriers to be fabricated from 7 GA. (.188") HR zinc plated flat steel.

   a. Pipe Barriers:

      i. Weldment comprised of 5/8" solid steel vertical rails, 1 1/8" O.D.x 11 GA (.120") steel horizontal rails with 203 or 303 stainless steel welded inserts with 5/8" internal threads, 1 1/2" x 1 1/2" x 29 1/2" angle iron. Barrier measures 33 7/8" wide x 39 13/16" high. Finish: PVC Coating.

      ii. 90º Bracket: Formed from 1/4" x 1 1/4" HRPO flat steel. Finish: Powdercoat.

9. Spacer Tubes

   a. 6061-T6 aluminum 7/8" O.D. x 1 11/16". Finish Powdercoat.

PART # - EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

A. The layout of the playground equipment shall be verified jointly by the installation contractor and general contractor after the perimeter concrete curb and subsurface grade preparation have been completed and prior to the excavation of any footings or thickened slab conditions. Safety zone limits, slopes, tie-ins, clearance requirements, etc. Shall all be confirmed prior to commencing equipment installation.

B. Excavation for direct-bury footings shall be performed carefully so as to minimally disturb the prepared sub-grade. All posts and supports shall be affixed and completely encase in concrete up to the level of the underside of the safety surfacing system's installation. At no time shall any component of the playground be in contact with native or non-native soil or fill, including any prepared or compacted gravel that could be considered part of the safety surfacing system.

C. Concrete footings/foundations shall be poured directly against the limits of excavation; footings shall not be formed and backfilled. Exposed surface of concrete footings shall be trowelled level and smooth.

D. Installation of the playground equipment shall be performed by the installation contractor that is certified by the manufacturer.

E. Installation shall closely follow all manufacturers' instructions and comply with all applicable manufacturers' recommendations.

F. Installation of Compound Structures and Independent Activities:

   1. Conform strictly to manufacturer's instructions using all appropriate materials, tools and accessories as required. Use only experienced personnel trained in play equipment construction. Layout all equipment prior to construction to insure compliance with safety zone clearances.

   2. Provide all concrete footings as required to properly place the equipment components.

G. Extreme care shall be exercised at all times during the installation stage of the project to prevent scratching, gouging, denting, twisting, warping, cracking or other result detrimental in any way to the finished product. All damage, regardless of how insignificant it may seem at the time, shall be tagged and photographed, and brought immediately to the attention of the Director. No repairs or touchups shall be implemented until the Director has had the opportunity to investigate the extent of the damage or made his/her determination on whether repair on site is acceptable or full replacement warranted. All items repaired prior to the Director's decision may be rejected at any time by the Director.

H. The Director reserves the sole right to determine whether any blemish, incursion or' damage to any part of the playground necessitates its replacement. All such decisions by the Director shall be final and the costs associated with the removal, replacement and reinstallation by the contractor shall be the contractor's sole responsibility.

I. The Director reserves the right to determine, based on the nature and extent of the damage, whether the corrective action is acceptable as punch-list item or if it is essential to the initial acceptance of the overall system.

J. Any repair approved by the Director shall be implemented in strict accordance with the manufacturer's requirements and shall not in any way void or alter the warranty or guarantees required of the project.

3.02 PROTECTION

Protection of the playground equipment from its arrival on the project site, through construction/installation of the playground equipment and the related playground safety surfacing system, and until acceptance by the County shall be the sole responsibility of the contractor. The contractor is hereby notified that playgrounds under construction are attractive nuisances and it is common for members of the public to circumvent construction barricades to climb upon, vandalize, damage and otherwise use such without authorization.

The contractor is therefore solely responsible to take all measures necessary, beyond the minimally required temporary barricade, to ensure the public does not enter the construction site at all times; park closure hours shall not relieve the contractor of its responsibility to secure its worksite nor shall it shift any responsibility to the County for security or otherwise.

Should the contractor decide to post security personnel on the site, such personnel shall meet be a registered uniformed individual(s) that holds a guard license from the Board of Private Detectives and Guards, Department of Commerce and Consumer Affairs, State of Hawaii in accordance with Hawaii Revised Statutes Chapter 463 and the Director shall be notified in advance of such. The Director shall be provided personnel's name and contact information, company name, insurance and other pertinent information as may be required by the County at the time.

3.03 INSPECTION

A. An authorized representative of the playground equipment supplier shall review and inspect the playground equipment installation to ensure all components (play elements, decks, roofs, panels, etc.) and accessories (bolts, fasteners, connectors, etc.) are correctly installed per the manufacturer's requirements and that the

installation as a whole is warrantable and guarantee-able. The representative shall check, at minimum, to see that all components are properly secured, no entrapment/entanglement conditions exist, all moving parts do so freely, all fasteners are properly tightened/secured, etc.

B. The prime contractor (not the playground equipment installation contractor) shall secure the services of an independent Certified Playground Safety Inspector certified by the National Playground Safety Institute, who is not n any way affiliated with the installation contractor or its supplier, to perform a thorough inspection/testing of the completed playground equipment installation in conformance with the NPSI's standards. At minimum, the inspector shall verify compliance with the applicable requirements of the 2010 ADA Standards, U.S. Consumer Product Safety Commission's Handbook for Public Playground Safety, and all referenced ASTM standards.

C. The contractor shall pay for all testing and laboratory fees.

D. The contractor shall coordinate the testing with the Director so that a representative from the County is present during the inspection.

E. The test results shall be provided in a typed or clearly printed format with each test areas identified by a photo and marked on a plan of the play area. Results shall be sent directly to the Director and, at minimum, the report shall include:

a. Name, mailing and business addresses, phone, fax and email addressed of the company the inspector works for.

b. Name, mailing and business addresses, phone, fax and email addresses of the inspector - if different that the company's.

c. County project name and number.

d. Report No.

e. Client name, address and telephone number

f. Location

g. Date

h. Determination of results

i. Certification of company or agency that testing representative works for.

F. The contractor shall send a copy of the inspector's report to the playground equipment supplier and request instruction on the proper resolution of each outstanding condition. No repair work, unless it poses an imminent safety risk, shall be performed prior to obtaining the playground equipment supplier's instructions. At no time shall any corrective work be performed that has not been concurred with by the Director or that would in any way jeopardize or nullify all or part of any warranty or guarantee required of the project.

3.04 CLEAN UP

A. Perform a thorough cleaning of all exposed surfaces of the playground equipment, per the manufacturer's recommendations, prior to final inspection. At minimum, all labels, wrapping, adhesive residue, dirt, dust, shavings, and other superficial blemishes shall be removed.

B. Perform a thorough final cleaning of the entire playground equipment, lubricate all moving parts and visually inspect the condition of the playground prior to acceptance by the County.

3.05 CLOSEOUT

A. The Contractor must submit three (3) copies of its standard maintenance manual to the Director.

B. Contractor must train Director's designated field personnel in proper cleaning and care procedures. This includes training field personnel how to properly use grooming equipment as well as make minor repairs.

C. Extra materials: Contractor shall deliver extra materials, in the amounts specified, to the Department of Parks and Recreation's Maintenance Division's main base yard at 35 Railroad Avenue, Hilo.

1. Provide a minimum of five (5) hand tools and five (5) power drill bits for each type of fastener head used on the playground equipment. They may be the same units used on this project provided they are in acceptable condition.

2. Provide a minimum of five percent (5%) of each type if fastener (i.e., screw, nut and bolt w/washer, etc.), cotter pin, etc. used on this project.

3. Provide a minimum of four (4) sets of each type and color of pole clamps.

4. Provide one (1) container of manufacturer's color-matched touch-up paint for each color metal component.

5. Provide two (2) containers of manufacturer's color-matched repair kit for the deck coating material.

END OF SECTION

SECTION 13120 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

Complete pre-engineered metal building system which includes:

A. Structural steel main building frames and secondary framing including purlins and girts, columns, bracings, engineered and fabricated by the building systems supplier.

B. Steel wall and roof system including flashing, gutters and downspouts.

C. Doors and louvers.

D. Roof accessories including skylights.

1.02 RELATED SECTIONS

A. Section 03300: CAST-IN-PLACE CONCRETE

B. Section 05400: COLD FORMED STEEL FRAMING

C. Section 05500: METAL FABRICATION

D. Section 07620: SHEET METAL FLASHING AND TRIM

E. Section 07920: JOINT SEALANTS

F. Section 08100: STEEL DOORS AND FRAMES

G. Section 09911: EXTERIOR PAINTING

H. Section 09912: INTERIOR PAINTING

I. Section 10200: LOUVERS AND VENTS

J. Section 11482: GYMNASIUM EQUIPMENT

L. Section 11483: INTERIOR SCOREBOARDS

M. Section 11484: GYMNASIUM DIVIDERS

1.03 REFERENCES

1. ASTM A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

2. ASTM A36 – Specification for Carbon Structural Steel. ASTM A53 –Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

3. ASTM A53 – Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
4. ASTM A123 - ASTM A123 – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A153 – Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
7. ASTM A490- Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
8. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
9. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
10. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
11. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
13. ASTM A992 - Standard Specification for Structural Steel Shapes.
14. ASTM F594 - Standard Specification for Stainless Steel Nuts.
15. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
16. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
17. AWS D1.1 – Structural Welding Code – Steel.
18. AWS D1.8 – Structural Welding Code – Seismic Supplement.
19. AWS A2.0 - Standard Welding Symbols.
20. AISI - Specification for the Design of Cold-Formed Steel Structural Members - 1986 Edition with 1989 Addendum.
21. “Specification for Design, Fabrication, and Erection of Structural Steel for Buildings” of the American Institute of Steel Construction.
22. ASTM A570-92 - Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
23. ASTM E1514-93 - Specification for Structural Standing Steam Steel Roof Panel Systems.

24. MBMA Low Rise Building Systems Manual - 1996 Edition.

25. SSPC (Steel Structures Painting Council) - SP-2-89 - Specification for Hand Tool Cleaning.

1.04 SYSTEM DESCRIPTION

A. Clear span rigid frame pinned at the base.

B. Clear opening height: Per design drawings.

C. Bay spacing of 20'-0 as shown on drawings.

D. Primary Framing: Rigid frame of rafter beams and columns, end wall columns and wind bracing over play court, covered walkway, and storage area as shown on plans. Frames shall be "supermarket" style columns, columns shall be straight within 10 feet of the ground. Bottom flange of main rafters shall be no less than 4" wide, and no greater than 14" wide.

E. Secondary Framing: Purlins, girts, eave struts, flange bracing, basketball backstop supports and other items detailed. Roof purlins shall be 12" deep maximum, and spaced a maximum of 5'-0" apart. Wall girts shall be 8" deep minimum and 12" deep maximum.

F. Lateral Bracing: Horizontal loads not resisted by main frame action shall be resisted by rods in the sidewalls and rods in the roof. Rod connections shall NOT punch through webs of columns/rafters. Rod connections to be clevis type with gusset plate welded to columns/rafters. Lateral bracing system shall be 100% redundant. For example, if two rows of bracing are used each set of braces shall be designed using 100% total lateral load. If three rows of bracing are used each set of braces shall be designed using 67% total lateral load. If 4 rows of bracing are used each set of braces shall be designed using 50% total lateral load.

G. Wall and Roof System, Flashing and Gutters: Preformed steel panels and accessory components.

H. Roof accessories including skylights and ventilators: Prismatic skylights and gravity ventilators and clerestory assemble.

I. Roof Slope: 2 in 12 for main roof, 2 in 12 for awnings and storage roof.

1.05 DESIGN REQUIREMENTS (2006 IBC)

A. Members to withstand the following building system loads:

1. Dead Loads

a. Basketball backstops = 3,000 pound concentrated gravity load applied to the bottom flange of every main rafter on column rows 3 thru 12. Load shall be located 16' from end wall as shown in building sections.

b. Wall louvers = see manufacturer

c. Collateral load = 3 psf (insulation, roof vents, lighting, fire sprinkler system)

d. Collateral load = 200 pound concentrated gravity load applied to every roof purlin and wall girt. Load shall be applied at the center of the span.

e. Gym Divider = 20 lb/ft

2. Live load = 20 psf with tributary area load reduction. Minimum reduced live load = 16 psf.

3. Wind load of 105 mph C exposure, Partially Enclosed Building (internal pressure)

4. Seismic use group III, Site Class B, Seismic Design Category E with Sds = 1.550 and Sd1 = 0..664 (Ss = 2.325, S1 = .996)

5. All loads shall be proportioned and applied in accordance with the MBMA Low Rise Building Systems Manual and the 2006 International Building Code.

B. Deflection requirements shall be in accordance with the applicable provisions of the AISC Steel Design Guide Series 3 - Serviceability Design Considerations for Low-Rise Buildings. Maximum lateral deflection shall be H/200.

C. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 40 to 100 degrees F.

D. Roof drainage system to withstand rainfall intensity of 6 inches per hour. Size roof drainage system per Uniform Plumbing Code.

1.06 SUBMITTALS

A. Submit as one complete set anchor bolt placement plan, column reactions, and building shop drawings to Structural Engineer at least 2 weeks prior to fabrication.

B. Fabrication to proceed based only on approved anchor bolt plan and building shop drawings.

1.07 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with MBMA Low Rise Building Systems Manual, and, for items not covered, AISC - Specification for Structural Steel for Buildings.

1.08 QUALIFICATIONS

A. Manufacturer: The company manufacturing the products specified in this Section shall have a minimum of 5 years experience in the manufacture of similar steel building systems in the United States of America.

B. Structural framing and covering shall be the design of a licensed Professional

Engineer experienced in design of this work, licensed in the State of Hawai'i. Structural steel drawings shall be stamped with original signature for use in obtaining the building permit for this project

1.09 FIELD MEASUREMENTS

A. Metal building contractor shall verify that field measurements are as indicated on erection drawings.

1.10 WARRANTY

A. Building manufacturer shall provide manufacturer's standard material warranty of minimum 10 years. The warranty shall include but not limited to warrant against corrosion of material.

B. Metal building contractor shall provide a workmanship warranty of 5 years. The warranty shall include but not limit to warrant against leaking from roofing, siding, flashing, skylights and ventilators.

C. The Surety shall not be liable for manufacturer's warranty beyond two years of the Contract Acceptance Date.

1.11 ADMINISTRATION

A. All nomenclature shall conform to the MBMA Low Rise Building Systems Manual.

B. Coordination and administration of the work shall be in accordance with the MBMA Low Rise Building Systems Manual - Common Industry Practices.

PART 2 - PRODUCTS

2.01 METAL ROOF SYSTEM

A. Roof System Design:

1. Design roof panels and liner panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.

2. Design roof paneling system to support design live, snow, and wind loads.

3. Endwall Trim and Roof Transition Flashings: Allow roof panels to move relative to wall panels and/or parapets as roof expands and contracts with temperature changes.

B. Roof System Performance Testing:

1. UL Wind Uplift Classification Rating, UL 580: Class 90.

2. Structural Performance Under Uniform Static Air Pressure Difference: Test roof system in accordance with ASTM E 1592.

3. Roof system has been tested in accordance with U.S. Army Corps of Engineers Unified Facilities Guide Specification Section 07 61 13.

C. Roof Panels:

1. Factory roll-formed, 24 inches wide, with 2 major corrugations, 2 inches high (2-3/4 inches including seam), 24 inches on center.

2. Flat of the Panel: Cross flutes 6 inches on center, perpendicular to major corrugations in entire length of panel to reduce wind noise.

3. Variable Width Panels:

   a. For roof lengths not evenly divisible by the 2'-0" panel width, factory-manufactured variable-width (9-inch, 12-inch, 15-inch, 18-inch, and 21-inch-wide) panels shall be used to ensure modular, weathertight roof installation.

   b. Minimum Length: 15 feet.

   c. Supply maximum possible panel lengths..

4. Panel Material and Finish: Special materials, gauges, or colors as applicable for custom designs.

5. Use panels of maximum possible lengths to minimize end laps.

6. Extend eave panels beyond structural line of sidewalls.

7. Factory punch panels at panel end to match factory-punched holes in eave structural member.

8. Panel End Splices: Factory punched and factory notched.

9. Panel End Laps: Locate directly over, but not fastened to, a supporting secondary roof structural member and be staggered, to avoid 4-panel lap-splice condition.

10. End Laps: Floating. Allows roof panels to expand and contract with roof panel temperature changes.

11. Self-Drilling Fasteners: Not permitted in weathering membrane of roof system.

12. Ridge Assembly:

   a. Design ridge assembly to allow roof panels to move lengthwise with expansion and contraction as roof panel temperature changes.

   b. Factory punch parts for correct field assembly.

c. Install panel closures and interior reinforcing straps to seal panel ends at ridge.

d. Do not expose attachment fasteners on weather side.

e. Use lock seam plug to seal lock seam portion of panel.

f. High-Tensile Steel Ridge Cover: Span from panel closure to panel closure and flex as roof system expands and contracts.

D. Vapor Retarder:

1. WMP-50, 0.0015-inch minimum thickness, UV-stabilized, white polypropylene, laminated to 30-pound Kraft paper / metalized polyester and reinforced with glass fiber and polyester scrim.

2. Perm Rating: 0.02.

E. Interior Liner Panels:

1. Form panels from 0.015-inch minimum thickness coated steel with minimum yield strength of 80,000 psi.

2. Painted Panel Finish:
   a. Exposed Side: 0.1-mil primer and 0.4-mil minimum interior white polyester paint.
   b. Unexposed Side: 0.3-mil minimum non-color-controlled wash coat.

3. Panel Dimensions: Nominal 36 inches wide with corrugations 1/2 inches high, 3 inches on center.

4. Factory cut panels to lengths required.

F. Provision for Expansion and Contraction:

1. Provision for Thermal Expansion Movement of Roof Panels: Clips with movable tab.

   a. Stainless Steel Tabs: Factory centered on roof clip to ensure full movement in either direction.

   b. Maximum Force of 8 Pounds: Required to initiate tab movement.

   c. Each Clip: Accommodates a minimum of 1.25-inch movement in either direction.

2. Roof: Provide for thermal expansion and contraction without detrimental effects on roof panels, with plus or minus 100-degree F temperature difference between interior structural framework of building and of roof panels.

G. Fasteners:

1. Make connections of roof panels to structural members, except at eaves, with clips with movable stainless steel tabs, seamed into standing seam side lap.

2. Fasten insulation board, bearing plates, and panel clips to structural members with "Scrubolt™" fasteners in accordance with erection drawings furnished by metal building system manufacturer, using factory-punched or field-drilled holes in structural members.
   a. Fasteners: Metal-backed rubber washer to serve as torque indicator.

3. Fasteners penetrating metal membrane at the following locations do not exceed the frequency listed:

   a. Basic Panel System: 0 per square foot.

   b. High Eave Trim, No Parapet: 2 per linear foot.

   c. Exterior Eave Gutter: 2 per linear foot.

   d. Panel Splices: 2 per linear foot.

   e. Gable Trim: 0 per linear foot.

   f. High Eave with Parapet: 0 per linear foot.

   g. Ridge: 0 per linear foot.

   h. Low Eave Structural: 1.5 per linear foot.

H. Accessories:

1. Accessories (i.e., ventilators, skylights, gutters, fascia): Standard with metal building system manufacturer, unless otherwise noted and furnished as specified.

2. Metal Coating on Gutters, Downspouts, Gable Trim, and Eave Trim: "Butler-Cote™ " finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.

3. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.

4. Material used in flashing and transition parts and furnished as standard by metal building system manufacturer may or may not match roof panel material.

   a. Parts: Compatible and not cause corrosive condition.

   b. Copper and Lead Materials: Do not use with Galvalume or optional aluminum-coated panels.

I. Thermal Performance:

1. Determine thermal performance in accordance with ASTM C 1363 and test U-factors for composite roof section.

2. “Thermax” Insulation Thicknesses: Maximum 4 inches.

J. Physical Properties:

1. WMP-50 Vapor Retarder:

a. For conditions of high interior humidity, UV-stabilized, white polypropylene film.

b. Water Vapor Permeance (perm) Rating, ASTM E 96: 0.02.

c. Minimum Workability Temperature: 20 degrees F.

2. “Thermax” Metal Building Board Insulation:

a. Class I Factory Mutual Approval and UL Fire Hazard Classification Ratings, UL 723:

1. Flame Spread: 25 or less.

2.02 WALL SYSTEM

A. Steel:

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792, Class AZ50 coating designation, Grade 40.

2. Gauge: 20

B. CONCEALED FASTENER WALL PANELS

1. Wall Panel Description:

a. Panel Width: 12 inches.

b. Profile: as indicated on drawings.

c. Profile: as indicated on drawings

d. Panel thickness: 7/8 thick.

e. Panel joint: Tongue and groove interlock joint.

f. Texture: Smooth

B. INSULATION

1. Glass-Fiber Board Insulation: ASTM C612, Type IA, unfaced semi rigid insulation. Nominal density of 3 pounds per cubic foot. Size as required for liner panels.

C. ACCESSORIES

1. Wall panel accessories: Provide accessories as required for a complete installation. Accessories shall be as indicated on approved shop drawings and per manufacturer's approved standard details. Match material and finish of metal wall panels.

2. Closure Strips:

   a. Closed Cell Closure Strips: Provide minimum 1 inch thick matching metal wall panel profile.

   b. Metal Profile Closure Strips: Shall be fabricated from same gauge, material and finish as metal panel.

3. Concealed Clips: 18 gauge; Zinc-Coated (Galvanized) Steel Sheet: ASTM A653, G90 coating designation

4. Trim:

   a. Fabricate trim from same material and material thickness as wall panels. Finish to match metal wall panels.

   b. Locations include, but are not limited to the following: Drips, sills, jambs, corners, framed openings, parapet caps, reveals and fillers.

   c. Trim shall be provided under Section 07620 - Sheet Metal Flashing and Trim

5. Metal Framing:

   a. General: ASTM C645, cold-formed metallic-coated steel sheet, ASTM A653, G40 hot-dip galvanized.

6. Panel Sealant:

   a. Joint Sealant: ASTM C920 as recommended in writing by metal wall panel manufacturer.

   b. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

7. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

D. FABRICATION

3. Metal wall panels and liner panels shall be formed to lap and interconnect with edges of adjacent panels which are then mechanically attached through panel to supports using concealed fasteners.

4. Fabricate metal wall panels to eliminate condensation on interior side of panel and with joints between panels designed to form weathertight seals.

5. Metal wall panels shall have site applied sealant at panel joints to provide a tight seal and minimize noise from movements within panel assembly.

6. Panels shall be factory formed. Field formed panels are not acceptable.

7. Curved wall panels: Panels shall be factory curved as approved by manufacturer.

8. Trim Accessories: Fabricate steel trim accessories to comply with recommendations outlined in SMACNA's "Architectural Sheet Metal Manual".

9. Mitered Corners: Structurally bonded horizontal outside or inside trimless corners matching metal wall panel material, profile and factory applied finish shall be fabricated by metal wall panel manufacturer.

10. Welded, riveted or field fabricated corners do not meet the requirements of this specification.

2.03 FINISHES

A. Steel
3. Finish and Color:

a. Color: Custom color as selected by Architect

b. Exposed Aluminum-Zinc Alloy-Coating; ASTM A792, Class AZ50 coating. "Galvalume" protective coating.

c. Finish System:

1) 2.4 mil. Fluropolymer (PVDF) Three Coat system: 0.8 mil primer with 0.8 mil Kynar 500 (70%) SOLID color coat and 0.8 mil clear coat.

2.04 MATERIALS - TRIM

A. Flashings, Internal and External Corners, Closure Pieces, Fascia, Infills, and Caps: Same material and finish as adjacent material, profile to suit system and formed as detailed.

B. Sheet Metal Flashing and Trim: Requirements for sheet metal flashing and trim are indicated in Section 07620 – SHEET METAL FLASHING AND TRIM.

2.05 DOORS AND FRAMES

A. Door and frame shall be designed by the manufacturer to meet the wind load provisions as specified in Section 1.05A. Door shall be designed using beam action to transfer loads from jamb to jamb.

B. Door and Frame as specified under Section 08100 – STEEL DOORS AND FRAMES.

C. Door Frame Support: Building system manufacturer's standard.

2.06 FABRICATION - PRIMARY FRAMING

A. Framing Members: Clean in accordance with SSPC-SP2, prepare, and shop primed.

B. Hot rolled members shall be fabricated in accordance with AISC Specification for pipe, tube, and rolled structural shapes.

C. Fabricate built-up members in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

D. Rigid frame columns shall be no deeper than 18" at the base. End wall columns shall be no deeper than 14" at the base and be of uniform section.

2.07 FABRICATION - WALL AND ROOF FRAMING

A. Framing Members: Clean in accordance with SSPC-SP2, prepare, and galvanize to ASTM A123, Class B.

B. Cold Formed Members: Cold formed structural shapes shall be fabricated in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices. Cold formed members shall be galvanized.

2.08 ACCESSORIES

A. Wall Louvers: Standards of storm resistant wall louvers shall be similar to those specified in Section 10200 – LOUVERS AND VENTS

B. Provide framing for door and louver openings.

C. Curbs for skylights, ventilators, etc. shall be compatible with steel roof panel and sealed against water penetration in accordance with building manufacturer's instructions.

2.09 SHOP PRIMING FOR FRAMING MEMBERS

A. Shop Primer and Touch-up Primer: Self-curing inorganic zinc primer

B. Cold Galvanizing Compound for field touch-up: Compatible with galvanizing.

C. Abrasives

1. Structural Steel – Abrasives shall be clean dry mineral sand, steel grit, mineral grit or manufactured grit and shall have a gradation such that the abrasive will provide a uniform profile.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions under provisions of Division 1.

B. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position.

C. Provide access to the work as scheduled for owner provided inspections, if required. The cost of any required inspections is the responsibility of the owner.

D. Upon delivery, the structural framing materials shall be washed and protected from the elements by storing them in a sheltered area or using protective covers. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

E. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

F. Treat all rust and surface imperfections prior to installation.

3.02 CLEANING AND SHOP PRIMING

A. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:

1. SSPC-SP 2 "Hand Tool Cleaning."

2. SSPC-SP 3 "Power Tool Cleaning."

3. SSPC-SP 5 "White Metal Blast Cleaning."

4. SSPC-SP 6 "Commercial Blast Cleaning."

5. SSPC-SP 7 "Brush-Off Blast Cleaning."

6. SSPC-SP 8 "Pickling."

7. SSPC-SP 10 "Near-White Blast Cleaning."

8. SSPC-SP 11 "Power Tool Cleaning to Bare Metal."

B. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

C. Painting: Apply a 1-coat, non-asphaltic primer complying with SSPC's "Painting System Guide No. 7" to provide a dry film thickness of not less than 1.5 mils (0.038 mm). In addition, apply finish painting system as specified under Section 09901 –

PAINTING except for area to receive fireproofing.

3.03 FIELD TOUCH-UP

A. Remove weld splatters, loose weld slag and other deleterious material with wire brush and other methods. Apply paint conforming to ASTM A 780 to welded and abraded galvanized areas, in conformance with manufacturer's instructions.

B. Abraded, burned or otherwise damaged shop coats shall be touched and/or refinished with the applicable shop coating noted above. After installation, paint connections and other areas where shop coat was omitted.

C. Paint shall be applied with a hand brush, thoroughly worked into all joints, corners and open spaces and well brushed over the surfaces. The paint shall not be applied to wet or damp surfaces and shall be dry when the material is loaded for delivery to the work.

D. Abraded, burned or otherwise damaged shop coats shall be touched and/or refinished with the applicable shop coating noted above. After installation, paint connections and other areas where shop coat was omitted.

E. Paint shall be applied with a hand brush, thoroughly worked into all joints, corners and open spaces and well brushed over the surfaces. The paint shall not be applied to wet or damp surfaces and shall be dry when the material is loaded for delivery to the work.

3.04 CORROSION PROTECTION

A. Where metals are incompatible to other materials, the contact areas of these materials shall be back coated before erection with an approved bituminous paint or other insulation coating as recommended by the fabricator.

B. After erection, all work shall be adequately protected against damage from grindings, polishing, cement or other harmful materials.

3.05 ERECTION - FRAMING

A. Erect framing in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

B. The erector shall furnish temporary guys and bracing where needed for squaring, plumbing, and securing the structural framing against loads, such as wind loads acting on the exposed framing and seismic forces, as well as loads due to erection equipment and erection operation, but not including loads resulting from the performance of work by others. Bracing furnished by the manufacturer for the metal building system cannot be assumed to be adequate during erection. The temporary guys, braces, falseworks and cribbing are the property of the erector, and the erector shall remove them immediately upon completion of erection.

C. Do not field cut or alter structural members without prior written and specific approval of the metal building manufacturer. Approval shall describe the allowable cutting and/or alterations.

D. After erection, prime welds, abrasions, and surfaces not galvanized.

3.06 ERECTION - WALL AND ROOFING SYSTEMS

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

3.07 ERECTION - GUTTER AND DOWNSPOUT

A. Install gutters and downspouts in strict accordance with manufacturer's instructions.

B. Connect downspouts to drain lines.

3.08 ERECTION – SKYLIGHTS AND VENTILATORS

A. Install in accordance with manufacturer's instructions.

B. Coordinate with installation of roofing system and related flashings.

C. Provide weather tight installation.

3.09 INSTALLATION - ACCESSORIES

A. Install door frame, door, and all other accessories in accordance with manufacturer's instructions.

B. Seal wall and roof accessories weather tight.

3.10 TOLERANCES

A. All work shall be performed in a workmanlike manner.

B. Install Framing in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

END OF SECTION

SECTION 15800 - VENTILATION

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in section 00700 - The INTERIM GENERAL CONDITIONS and these SPECIAL CONDITIONS shall govern all work specified in all DIVISIONS and SECTIONS. Whenever the term “SPECIAL PROVISIONS” appears in these specifications, it shall be replaced with the term “SECTION 00800 - SPECIAL CONDITIONS”.

B. Section 15000, "General Mechanical Requirements", applies to this section with the additions and modifications specified herein.

1.02 WORK SPECIFIED IN THIS SECTION

A. Provide complete and operating ventilating system. "Provide" shall mean "furnish and install" when used herein.

1. Electrical: Provide all controls for this work. Mount control devices and provide control wiring and conduit. Furnish motor starters for equipment under this section.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Electrical: Mounting of starters and providing of fused or non-fused disconnect switches, circuit protection, power wiring conduit are under DIVISION 16 ELECTRICAL.

B. Painting of this work is under DIVISION 9 FINISHES, unless otherwise indicated hereinafter.

1.04 QUALITY ASSURANCE

A. Comply with all the requirements of the County of Hawaii and State of Hawaii.

B. Obtain and pay for all fees, permits, licenses, assessments, and inspections required for this work.

C. Unless specified under the General Provisions of the approved Construction contract, substitutions of another manufacturer's product for equipment specified hereinafter and for items with "or equal" after the brand name requires written permission by the Engineer substitution deadline. No substitution will be considered after the bid opening.

D. Comply with the recommendations and requirements of the Codes and Standards listed hereinafter in addition to detailed requirements of this specification.

1. American National Standards Institute (ANSI) Standards:

B9.1-1991	Safety Code for Mechanical Refrigeration
C1-1981	National Electrical Code

2. National Fire Protection Association (NFPA) Standards:

90A-1993 Air Conditioning and Ventilating Systems

3. Air Conditioning and Refrigeration Institute (ARI) Standards:

410-1986 Forced-Circulation Air Cooling and Heating Coils.
443-1986 Sound Rating of Room Fan Coil Air Conditioning

4. Air Moving and Conditioning Association (AMCA) Standards:

210-1985 Test Code for Moving Devices
300-1985 Test Code for Sound Rating Air Moving Devices

5. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE):

Handbook, Applications - 1991
Handbook, Equipment - 1992

6. American Society of Mechanical Engineers (ASME):

Section VIII Boiler and Pressure Vessel Code and Interpretations: Pressure Vessels, Division 1 1992 and Addenda Summer 1992

7. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

Low Velocity Duct Construction Standards, 1985.

1.05 SUBMITTALS

Submit under provisions of Section 01019 and 01300- SUBMITTALS. Submit six (6) copies of each submittals required hereinafter.

A. Equipment Submittals: Before beginning work, submit for review manufacturer certified literature showing ratings and dimensions of equipment and of a list indicating all materials and items that are of a different manufacturer or model than those specified. Include equipment wiring diagrams.

B. Shop Drawings: After review of equipment, submit for review and approval dimensioned installation shop drawings to scale showing details where space requirement presents problems; proposed departures from the Contract Documents due to field conditions, requirements for concrete work, access panels, inserts in slabs, and openings in structure.

C. As-Built Drawings: Record changes from the contract drawings of all concealed piping, duct work and equipment. Indicate location of isolating valves, dampers, and items requiring maintenance or inspection. Submit as-built drawings in accordance with Section 01300-Submittals.

D. Operation and Maintenance Manuals: Furnish operating and maintenance manuals on all equipment and the system as a whole and in accordance with Section 15000 - General Mechanical Requirements.

E. Certificates: The Owner will have the right to require a written certificate, dated and signed by a responsible employee of the Contractor, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Whenever a regulatory agency performs inspections or tests of any portion of the work, a certificate shall be furnished by the Contractor that the inspection or test was satisfactorily passed.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

Furnish new equipment, material, and accessories bearing the manufacturer's identification. Coordinate deliveries to avoid interferences or construction delays. Protect products during delivery, storage, installation and the remainder of the construction period after installation.

1.07 GUARANTEE

All work in this section shall be guaranteed for a period of one year from the date of acceptance of the work as a whole by the County and as indicated in Section 15000. Correction of undue noise or vibration is included in the guarantee.

Normal maintenance requirements are not included in this guarantee. Should any equipment or material fail within this period, the Contractor shall be responsible for any damage to any part of the premises caused by leaks in piping or equipment for a period of one year after final acceptance of the work as a whole by the County.

PART 2 - PRODUCTS

2.01 GENERAL

Asbestos Prohibition: No asbestos containing materials or equipment shall be used under this section. The Contractor shall ensure that all materials and equipment incorporated in the project as asbestos-free.

2.02 EQUIPMENT

A. Capacities and characteristics of equipment are indicated on the drawings. See electrical drawings for all voltage and phase requirements of all equipment furnished under this work. Provide combination magnetic across-the-line starter and circuit breaker for each motor of mechanical equipment unless the equipment is factory wired to a single power connection or unless otherwise indicated herein-after. Provide NEMA 3R weatherproof starters with fiberglass enclosure for the outdoor installation. Provide vibration isolators as indicated hereinafter.

Equipment	Isolator Description*	Deflection
Fan Coil Unit	Neoprene coated spring	1.0"
Air Cooled Condensing	__with galvanized steel	

Units housing

*Isolator mounting location shall be in accordance with manufacturer's dimensioned drawings. Isolators shall be sized to provide specified static deflection from manufacturer's published loading information at each mounting point, based on operating weight.

2.03. CENTRIFUGAL EXHAUST FANS

A. General Description:

1. Downblast fan shall be for roof mounted applications

2. Performance capabilities up to 44,700 cubic feet per minute (cfm) and static pressure to 2.5 inches of water gauge

3. Fans are available in twenty sizes with nominal wheel diameters ranging from 11 inches through 54 inches (071 - 540 unit sizes)

4. Maximum continuous operating temperature is 180 Fahrenheit (82.2 Celsius)

5. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

B. Wheel:

1. Constructed of aluminum

2. Non-overloading, backward inclined centrifugal

3. Statically and dynamically balanced in accordance to AMCA Standard 204-05

4. The wheel cone and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency

C. Motors:

1. Motor enclosures: Open driproof

2. Motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and furnished at the specific voltage and phase.

3. Mounted on vibration isolators, out of the airstream.

4. For motor cooling there shall be fresh air drawn into the motor compartment through an area free of discharge contaminants.

5. Accessible for maintenance

D. Shafts and Bearings:

1. Fan shaft shall be ground and polished solid steel with an anti corrosive coating

2. Permanently sealed bearings or pillow block ball bearings

3. Bearing shall be selected for a minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.

4. Bearings are 100 percent factory tested.

5. Fan Shaft first critical speed is at least 25 percent over maximum operating speed.

E. Housing:

1. Motor cover, shroud, curb cap, and lower windband shall be constructed of heavy gauge aluminum.

2. Shroud shall have a integral rolled bead for extra strength.

3. Shroud shall be drawn from a disc and direct air downward.

4. Lower windband shall have a formed edge for added strength.

5. Motor cover shall be drawn from a disc.

6. All housing components shall have final thicknesses equal to or greater then preformed thickness.

7. Curb cap shall have pre-punched mounting holes to ensure correct attachment.

8. Rigid internal support structure.

9. Leak proof

F. Housing Supports and Drive Frame:

1. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators

G. Vibration Isolation:

1. Double studded or pedestal mount true isolators

2. No metal to metal contact.

3. Sized to match the weight of each fan

H. Disconnect Switches:

1. NEMA rated: 4X

2. Positive electrical shut-off

3. Wired from fan motor to junction box installed within motor compartment

I. Drive Assembly

1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower

2. Belts: Static free and oil resistant

3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts

4. The motor pulley shall be adjustable for final system balancing

5. Readily accessible for maintenance

J. Options/Accessories:

1. Auto Belt Tensioner:

   a. Automatic tensioning device that adjusts for the correct belt tension, only for single drives

2. Birdscreen:

   a. Material Type: Aluminum
   b. Protects fan discharge
   c. Type: [GPE] [GPEX] [ISB] [ASE]
   d. Material Type: [Aluminum] [Galvanized]
   e. Coating: [None] [Permatector] [Hi-Pro Polyester] [Primer] [Baked Enamel]

3. Curb Seal:

   a. Rubber seal between the fan and the roof curb

4. Dampers:

   a. Type: Gravity
   b. Prevents outside air from entering back into the building when fan is off
   c. Balanced for minimal resistance to flow
   d. Galvanized frames with prepunched mounting holes

5. Finishes:

   a. Types: Permatector

6. Hinge Kit:

   a. Aluminum hinges

b. Allows the fan to tilt away for access to wheel and ductwork for inspection and cleaning

7. Hinge Base:

a. Aluminum hinges

b. Hinges and restraint cables are mounted to a base (sleeve)

c. Allows the fan to tilt away for access to wheel and ductwork for inspection and cleaning

8. Pressure Probe:

a. ¼ inch diameter tube in the fan venturi that allows hook up to manometer

9. Tie-Down Points:

a. Four heavy gauge aluminum brackets to secure the fan in heavy wind applications

2.04 DUCT WORK AND ASSOCIATED SHEET METAL WORK

A. All low velocity ducts shall be galvanized steel with gages and construction in accordance with Chapter 1, Air Duct Design, 1988 Equipment Volume ASHRAE Handbook. Use of duct board will not be approved.

B. All sheet metal duct work shall be sealed at all joints and made air tight by applying an approved sealant compound around all joints per the manufacturer's recommendations.

2.05 AIR DISTRIBUTION DEVICES

A. All aluminum construction for face plates, frames and grilles:

1. Volume Dampers: All aluminum construction with locking device. Contractor shall provide access doors at all volume damper locations to provide for adjustments during balancing of the ventilation system. Ruskins or equal.

2. Exhaust Registers: All aluminum construction, surface-mounted with opposed-blade volume damper, off-white baked enamel finish. Titus 350 or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

Visit the work-site and become fully aware of all existing conditions. Investigate the Contract Documents and make proper provisions to avoid interferences or construction delays. Determine the exact route of each duct and pipe.

Make offsets and changes in shape or direction required to maintain proper headroom and pitch or to accommodate the structure and the work of other trades. When changing the shape of duct

work, provide ducts having the same friction loss as the size of the duct shown on the Contract Documents. Furnish other trades with information to properly locate and size openings in the structure required for the work under this Section. Furnish anchor bolts, sleeves, inserts and supports required for the work under this section. Provide access panels for concealed items provided under this section that require maintenance, adjustment or inspection.

3.02 INSTALLATION REQUIREMENTS

Perform work using personnel skilled in the trade involved. Provide competent supervision. Furnish new equipment, materials and accessories bearing the manufacturer's identification and conforming to the recognized commercial standards. Provide OSHA approved guard all around exposed moving machinery parts and around high-temperature equipment and materials. When exposed to weather, provide a protective enclosure around electrical equipment, controls and other items that are not satisfactorily protected. No piping, electrical conduit, ceiling supports or similar items shall be supported from air conditioning equipment or duct work.

3.03 EQUIPMENT INSTALLATION

Install equipment in the space allotted with sufficient clearance for proper operation and maintenance, and with sufficient head clearance according to the building code. Where equipment differs in arrangement or connections from those shown, provide all required changes in piping, supports and appurtenances. Provide equipment accessories necessary for proper operation and support. Concrete equipment bases and supports are under DIVISION 3 CONCRETE. Direct trade providing concrete in the proper locations, dimensions, load carrying capacity and anchor bolt locations. Concrete pads shall be not less than 6 inches above adjacent surfaces and shall extend 6 inches beyond the base of the equipment. Provide vibration isolators for all mechanical equipment as indicated hereinbefore. Secure floor-mount isolators to base and to equipment. Provide concrete inserts at all pre-stressed planks for hanger rods and coordinate with pre-stressed plank contractor for insert location.

3.04 SHEET METAL DUCT WORK

A. Construct in accordance with the SMACNA Duct Manual for Low Velocity Systems, 4th edition. Provide curved elbows with inside radius equal to the duct width. At Contractor's option, 90-degree elbows may be square with factory-fabricated airfoil turning vanes. Provide factory-fabricated adjustable air extractors in straight branch duct tap-ins or use radius tap-ins. provide adjustable air extractors at supply air registers and diffuser tap-ins. Provide splitter dampers at all splits in the duct runs constructed in accordance with Plate 29, Fig. A of SMACNA Duct Manual. Provide dampers where indicated with opposed blades and locking quadrant. Provide flexible duct connections at inlet and outlet of all air moving devices. Seal watertight all duct work exposed to weather, and cross-break to shed water. Provide stiffeners as required to assure no water puddling.

   1. Contractor is to provide volume dampers at all duct locations for proper balancing of the HVAC system and as indicated on the drawings. All volume dampers are to be made accessible for adjustment. Provide access doors as required.

3.05 ELECTRICAL

Conform to the requirements of ANSI, CI, National Electrical Code, and to the requirements of

DIVISION 26 ELECTRICAL of these specifications. Obtain equipment manufacturer's control wiring diagrams for the equipment furnished. Prepare a control and interlock wiring diagram for the complete system. Indicate terminal connection points to factory-wired equipment. Submit control diagram for review. Furnish motor starters for all electrically driven ventilating equipment, complete with circuit breaker, one overload relay per phase, 120-volt control circuit and horsepower rating. Provide NEMA 3R weatherproof starter with fiberglass enclosure for outdoor equipments.

3.06 BALANCE, ADJUST AND TEST

A. Scope: Test mechanical systems to determine quantitative performance. Compare observed quantities with design quantities. Adjust systems to produce observed quantities that will conform to design quantities within tolerances specified. Balance the flow of fluids to conform to design, lock and mark adjustment, and leave systems in balance.

All testing and balancing of the air conditioning system shall be performed by a certified independent testing and balancing company with NEBB standards and procedure.

B. Job Conditions: Ventilating equipment shall have been completely installed and shall be put into continuous operation as required to accomplish the test adjustment and balance work specified. Test, adjust and balance shall be performed when outside conditions approximate design conditions indicated for cooling functions.

C. Certified Reports: Submit test reports on approved forms with certification by the Testing Engineer that the methods used and the results are as specified.

D. Air Balancing Instruments: Alnor velometer with probes and Alnor pitot tube. Rotating vane anemometer. ASHRAE Standard pitot tubes constructed of stainless steel, 1/16-inch O.D., lengths 18 inches, 36 inches, Dwyer Model 160 or equal. Magnehelic differential air pressure gauges. 0 to 0.5 inch, 1 to 1.0 inch and 0 to 5.0 inches water pressure ranges, each arranged as a portable unit for use with a standard pitot tube. Dwyer Series 2000 or equal. Combination included vertical portable manometer, range 0 to 5.0 inches water. Dwyer No. 400 or equal. Portable type hook gauge. Range 0 to 23 inches water. Dwyer No. 1425 or equal. Portable flexible U-tube manometer with magnetic mounting clips. Range 18 inches. 0 to 18 inches water. Dwyer No. 1215-20 or equal.

E. System Performance Measuring Instruments: Insert thermometers, with graduations at 0.5 F. for air and 0.1 F. for water. sling psychrometer. Tachometer, automatic type. Clamp-on type voltameter with minimum ranges: 0/600v on three scales; 0/800 amp on five scales. Records: 7-day chart, portable type for temperature and humidity.

F. Procedures:

1. Air systems: Test and Balance system in accordance with SMACNA manual for the Balancing and Adjustment of Air Distribution Systems.

2. Preliminary: Size, type and manufacturer of air terminals and all tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations unless field test shows ratings to be impractical.

3. Central System: Test and adjust exhaust fan RPM to design requirements within the limits of mechanical equipment provided. Test and record motor voltage and running amperes. Record motor name, plate date and starter ratings. Balance the air systems such that the volume damper of the farthest air device in the exhaust duct system is 100% open. Provide and replace necessary fan pulleys and belts to meet the air balancing requirements.

G. Submission of Reports: Fill in test results on approved report forms. Submit three certified copies of required test reports to the Owners Representative for approval.

3.10 CLEAN-UP

Cleanup the work provided under this section. Touch up with matching paint all damaged factory finishes.

3.11 PAINTING AND IDENTIFYING

A. The items furnished under this section are to be painted and identified under DIVISION 9 FINISHES. Do not paint over nameplates or other identifying labels.

1. Paint exposed black iron work including pipe, fittings, iron body valves, pipe hangers, etc. with two coats of lead and oil paint.

2. Painting of exposed bare metal surfaces in finished areas shall be provided herein if it is not specified under DIVISION 9 FINISHES. Included in this work shall be bare metal register, louvers, access panels for mechanical equipment, control covers and thermostat covers, duct work, piping, hangers, etc. Refer to architectural finishing schedule for finish required. Prepare surface as required for oil-base enamel paint. Provide two final coats matching adjoining surface finish.

3.12 INSTRUCTIONS

Instruct the County in the proper operation and maintenance of the system. Review the maintenance manuals with the County. Post starting and stopping instructions and control diagram adjacent to equipment, mounted in frame with glass cover plate. Submit a list of manufacturer's warranties for the equipment furnished.

3.13 CERTIFICATES

The Engineer shall have the right to require a written certificate, dated and signed by a responsible employee of the Contractor, evidencing the performance of any portion of the work, or any testing as a condition precedent to the acceptance of any work or the results of any test. Wherever a governmental authority performs inspections or tests of any portion of the work, a certificate shall be provided by the Contractor that the inspection or test was satisfactorily passed.

END OF SECTION